The University of Chicago

THE BUILDING INDUSTRY AND BUSINESS CYCLES

A PART OF A DISSERTATION SUBMITTED TO THE FACULTY OF THE SCHOOL OF BUSINESS IN CANDIDACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

1934

By

WILLIAM HERMAN NEWMAN

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PREFACE

The current economic depression has given rise to hasty, governmental action much of which was based upon a meager understanding of the important issues involved. There has resulted a renewed awareness of the need for critical analysis of past business fluctuations; and many studies are being carried on to satisfy this need. The present monograph reports such a study; it contains the essential portions and conclusions of a doctoral dissertation on "The Building Industry and Business Cycles." Anyone interested in a fuller, though less readable, discussion of sources of information and methods of analysis may refer to the complete, unpublished manuscript filed in the University of Chicago Libraries.

Grateful acknowledgments are due to more individuals than can be mentioned. Dean William H. Spencer has been generous with grants from the School of Business in my behalf. Professor Garfield V. Cox has been a most unselfish and helpful counselor throughout the entire investigation. Many busy men, especially those in city building departments, have kindly supplied statistical data. Mr. Homer Hoyt has been ever ready to supply materials from his personal files and suggestions from his experience with similar studies; and for the charting I am indebted to Messrs. Clarence and David Revzan. Only through the cooperation of such men as these is the present monograph possible.

W. H. N.

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CHAPTER I

INTRODUCTION

In the literature on business cycles and the discussions which seek to explain them, we find frequent reference to fluctuations in the volume of construction; and many analysts maintain that the very core of cyclical changes in business may be found in the extreme variation of constructional activity. In light of this key position attributed to construction, it is highly important that the nature of, and reasons for, fluctuations in such activity be subjected to rigorous inductive and deductive analysis. Such a task is an ambitious one, and investigation showed that considerable groundwork was needed on the component parts of the construction industry before generalizations about total construction could be tested. This study seeks to contribute to such groundwork by analyzing an important segment of construction work.

As a means of delimiting the scope of the present investigation, the building industry was chosen as a vital part of constructional activity. Within the field of the building industry, considerable attention has been given to public building; but surprisingly little work beyond the collection of raw data has been done on the balance of the industry. For this reason the present study concentrates on that large part of building which depends upon private initiative for its inception and execution.

Use of the term "building industry."—Consideration of almost any current social problem involves the use of terms which are given widely different content in popular usage. The problem at hand is no exception, and at the outset we must block off in a general way the field of discussion.

Of terms intimately associated with "building," perhaps "construction" is subject to the greatest divergence of usage. The word has been used to mean anything from the production of all capital goods to the mere erection of shells of buildings. Generally, in economic literature, construction is used in a broad sense, including the production of all *durable* goods which are *fixed* in location.

"Building" usually has a more restricted meaning. Building, like construction, is limited to durable and fixed goods; but in addition the term excludes such things as roads, river and harbor work, and even bridges and sewers. Building as used here is best differentiated from construction, in that *shelter* is also implied.

The "building industry," then, refers to that group of firms, contractors, workers, equipment, and organization directly involved in the erection of buildings, i.e., the erection of durable goods fixed in location which provide shelter to man and his varied activities. This definition excludes both suppliers of building materials and ultimate owners of structures, unless they are directly involved in the actual erection of the buildings.

A further classification of building frequently used in this study needs elucidation. This is the division between "private" and "public and semi-public" building. In contrast to much that has been written on construction, this monograph is concerned with those buildings erected by private enterprises and individuals each seeking to maximize his profit or satisfaction, rather than construction carried on as a co-operative venture by governments and eleemosynary associations. The public and semi-public group includes all governmental and educational buildings; such non-profit co-operative ventures as hospitals, and religious and memorial buildings; and also public-utility buildings. In the private-building group are included such as the following: office buildings, lofts, warehouses, factories, garages, hotels, apartments, and dwellings. It is the fluctuations in this latter type of building that are considered in this study.

Importance of the building industry.—The size of the construction industry is variously estimated, ranging in good years from seven to ten billion dollars annual volume of business, depending upon the comprehensiveness of the term "construction." Even the conservative estimates indicate that, in 1929, work done in construction was greater than the value of products in the automobile or the iron and steel industry, and that the number of workers directly employed was much larger.

Within this vast volume of construction, private building usually makes up one-third to one-half of the total. Thus, private building alone accounts for an annual volume of business ranging up to four bil-

lion dollars. Half a million workers and their families depend upon it for their support. The industry is widely distributed geographically and draws materials from many other industries. Should the volume of activity in private building fluctuate, repercussions would be felt throughout the whole economic structure.

Characteristics of buildings.—There are significant qualities of buildings as economic goods which will be met with repeatedly in the following pages. It will be well to mention the more outstanding of these explicitly.

The most important characteristic of buildings is their great *durability*. The economic life of most buildings ranges from a fifth to a half of a century, depending upon the type of construction and exposure to the elements. This great durability has a number of corollaries. For example, the valuation of any building necessitates long-range forecast of the value of the services which that building will render. Again, for any such durable good the factor of obsolescence becomes important. Still another consequence of durability is that a large expenditure relative to the annual income is involved at the time of erection.

A second basic characteristic of buildings is their *immobility*. Once a building is erected, it is wedded to a particular location, with the result that the building has economic value only if the services which it can render are desired at that particular place. The two characteristics, durability and immobility, make the period of transfer of building resources extremely long.

While one may speak of building as a general kind of economic good, between any two buildings there is much *individual variation*. Buildings differ in size and in both internal and external arrangement for each size. The materials with which they are constructed have different qualities, and the workmanship for any particular building is subject to considerable variation. Individual differences, combined with immobility, result in an almost complete absence of uniform units of building.

The boy in the cherry tree or the housewife in the store may make decisions of "more or less," and these decisions are often repeated one day after another. Such is not true for buildings. Buildings come in *large units*, and a single individual purchases a building but once or twice in his lifetime. The purchase or sale even of small buildings in-

volves amounts vastly greater than the average business transaction. True, one may lease only a part of a building and for only a brief period of time, but the facts of durability and of large units remain to be faced by the owner of the property.

Buildings are distinctive, then, in their durability, immobility, individual variation, and large size of units.

Nature of the building industry.—As further background for the discussion in succeeding chapters, some of the outstanding economic aspects of the building industry may be mentioned. In the first place, the method of producing buildings is characterized by (*a*) work on the grounds, (*b*) non-repetitive operations, (*c*) handicraft methods, and (*d*) comparatively little mechanical equipment relative to the volume of work done.[1]

In the second place, buildings are erected under a bidding-and-contract system in which a particular building or part thereof is produced only *after* a contract has been signed designating the type of work to be done and the approximate price to be paid. For any large building a whole hierarchy of contracts may arise headed by the general contract for the entire building and working downward to agreements for such things as cut stone and lighting fixtures. Various firms seeking business must submit bids, depending on their bid price and their reputation for workmanship to get them the job.

Thirdly, the building industry is one of the few major industries in which "rugged individualism" still predominates. Because buildings are non-uniform goods produced by localized, handicraft methods, the industry has remained unorganized. Each contractor meets the particular job in his own way, with the result that individualistic competition is the typical situation.

Finally, so marked is the seasonal fluctuation of activity in the building industry that even a brief survey should include some mention of the phenomenon. Such fluctuations indubitably had their origin in variable weather conditions, but they are much more prevalent than weather necessitates. Despite their importance, however, the present

[1] In 1929 the value of construction equipment was only 12.3 per cent of the value of the work done by general contractors and 4.9 per cent of the work by sub-contractors. See *Construction Industry* (Washington: Government Printing Office, 1929), p. 40.

study abstracts from seasonal fluctuations because they are clearly defined and their nature well known; their elimination is a problem in itself.

Factors which influence building activity.—With the foregoing definitions and characteristics of buildings and the building industry in mind, we are ready to consider the various factors which influence the volume of building activity. Confusion will be avoided if the point of view of this study is kept in mind. Being concerned with building activity, it is from the viewpoint of the end-product of that activity—the newly finished building just ready to be passed on to the ultimate owner—that the different factors are considered.

The relationship of the various factors to be considered may be clarified if we briefly indicate their bearings upon an entrepreneur's decision to build or not to build. The entrepreneur may make either of two approaches: he may reduce all payments, both coming in and going out, to their present value in order to discover whether all incomes will be greater than all expenses; or, he may estimate incomes and outgoes for a typical year in order to see whether there will be an annual net profit.

The factors entering into a decision following the first approach are, using PV for the present (discounted) value of one or more payments in the future:

Receipts		*Outlays*
PV gross revenues + PV scrap value	$\geqslant$	Cost of construction + PV operating expenses and taxes + PV interest payments

These factors may be transposed in any fashion (e.g., PV operating expenses and taxes to the left side of the equation, leaving all known sunk cost on the right side and having all estimations on the left side), but their presence and influence on a decision remain the same. It is at once apparent that the rate of interest will affect a decision in two ways, in figuring the present values of the future payments and in determining the amount of interest payments. The cost of construction likewise enters in twice; it is one of the explicit factors, and it influences the size of the interest payments. Depreciation as such is not involved in the foregoing decisions; but in determining scrap value and the period over

which gross incomes will be received, similar estimates are necessarily made.

The second approach regards the building for a typical period of its operation—say a year. Following this line of thought, the factors entering into a decision as to the profitability of the building are:

Gross revenue	− (operating expenses, taxes, and depreciation)	≷ Cost × interest rate,
Net revenues		≷ Interest payments.

Here depreciation takes the place of explicit mention of costs and of scrap value. The construction cost still affects the decision in two ways, through depreciation and through interest charges. It may appear that interest enters into the equation only once, for there is no discounting of future incomes. If all funds were borrowed, this would be true, and only the contract rate would be significant. If, however, part of the funds are supplied by the entrepreneur, then he must use the capitalization rate in his decision to invest. In deciding to tie up his own capital, the entrepreneur must consider the alternative return which he might get by currently investing in long-term securities, and this return depends upon the average market rate or "the capitalization rate." Thus, the rate of interest plays a dual rôle in either approach.

Subsequent chapters will deal with building costs, interest rates, population growth, and other indications of changes which affect gross and net building incomes. But first the statistical measurement of fluctuations in building activity must be considered.

CHAPTER II

FLUCTUATIONS IN BUILDING ACTIVITY AND BUSINESS CYCLES

A measure of building activity.—As a basis for study it was necessary to construct a guide or index to fluctuations in private building activity extending over as long a period as possible. Building permits are the most satisfactory data upon which to base such an index. They are available in monthly form back through 1903, and annual figures extend back for another quarter of a century. Moreover, building permits adequately represent geographical regions; and they measure, primarily, private building activity.[1]

Building-permits data are subject to a number of minor weaknesses,[2]

[1] By far the predominant part of building permits represents private building. As the *Commercial and Financial Chronicle* states, "they do not include engineering projects, nor do they as a rule include public works construction such as sewers, subways and highway work in the nature of bridges, grade crossing elimination and the like, and often do not include education buildings, social and recreational structures, and public hospitals" (January 28, 1933, p. 553). Moreover, a comparison of the building-permits index with private building as reflected in Dodge contracts shows that building permits fluctuate in volume very much as do private contracts; in fact, they tend to follow the residential building even more closely than the index of total private building.

[2] These weaknesses include: (1) omission of farm and small village building, (2) differences in city regulations regarding buildings for which permits are required, (3) the recording of estimated cost rather than actual cost, and (4) lapses of permits after issue. Since the proportion of building in cities of various size remained approximately the same from 1921 to 1932, while the index of volume fluctuated between 222 and 23, the omission of farms and smaller cities is not serious for present purposes. Both differences in city regulations and differences between recorded and actual costs tend to be a constant bias, and thus do not affect fluctuations in a permits index. The lapses also tend to be a constant percentage, normally amounting to between 2 per cent and 3 per cent of the total; unusual cases caused by such things as pending city or state building legislation may, however, affect the proportion of lapsed permits noticeably (e.g., the New York multiple-dwelling law in the spring of 1929). Another characteristic of building permits, though not necessarily a weakness, is that, on the average, they precede the commencement of the excavation by about a week and the completion of the building by about four months.

and as a result small fluctuations from one month to the next cannot be regarded as significant. With a few unusual exceptions, however, the errors will tend to be averaged out when a large group of cities is considered; and we may conclude with Mr. Riggleman that "in spite of limitations it is quite probable that few industries have a better index of activity over a long period of time than the building industry has in building permits."[3]

In constructing an index of building activity the following sources of permits data were used: *Bradstreet's* monthly index of building permits in 120 identical cities, 1911 to date; Babson's monthly permits totals for 20 cities, 1903–11; Ayres's annual totals of building permits in 50 cities, 1900–1903; and, permits in 3–13 cities, 1875–1900. These permits figures were corrected for seasonal fluctuation where necessary, chained together to form a continuous series, and expressed relative to a 1920–30 base.

The index of building activity just described is based on the dollar value of building permits. To allow for the wide changes in building costs in the half-century under consideration, the foregoing index was divided by a building-costs index. The resulting series is an approximation of the physical volume of building activity—physical volume being conceived as a composite of various types of building materials and labor. This deflated index is used throughout the study as a guide to fluctuations in building activity, and for sake of brevity it is called the "B.B.N. index."[4] It is shown graphically in Figure 1 along with two other annual indexes of building activity (deflated), and may be found in the Statistical Appendix.

Fluctuations in the B.B.N. index of building activity.—The outstanding characteristic of the index of building activity is the presence of major fluctuations or what, for want of a better term, have been called "major cycles," lasting from fifteen to twenty-one years. The first major cycle began in the middle seventies and lasted almost to the turn of the century; the second cycle, twenty-one years in length like its prede-

[3] "Building Cycles in the United States 1875–1932," *Journal of American Statistical Association*, June, 1933, p. 175.

[4] Conclusions reached by the use of the B.B.N. index were checked, for 1919–33, by an index of private building activity based on F. W. Dodge reported contracts for residential, commercial, and factory buildings.

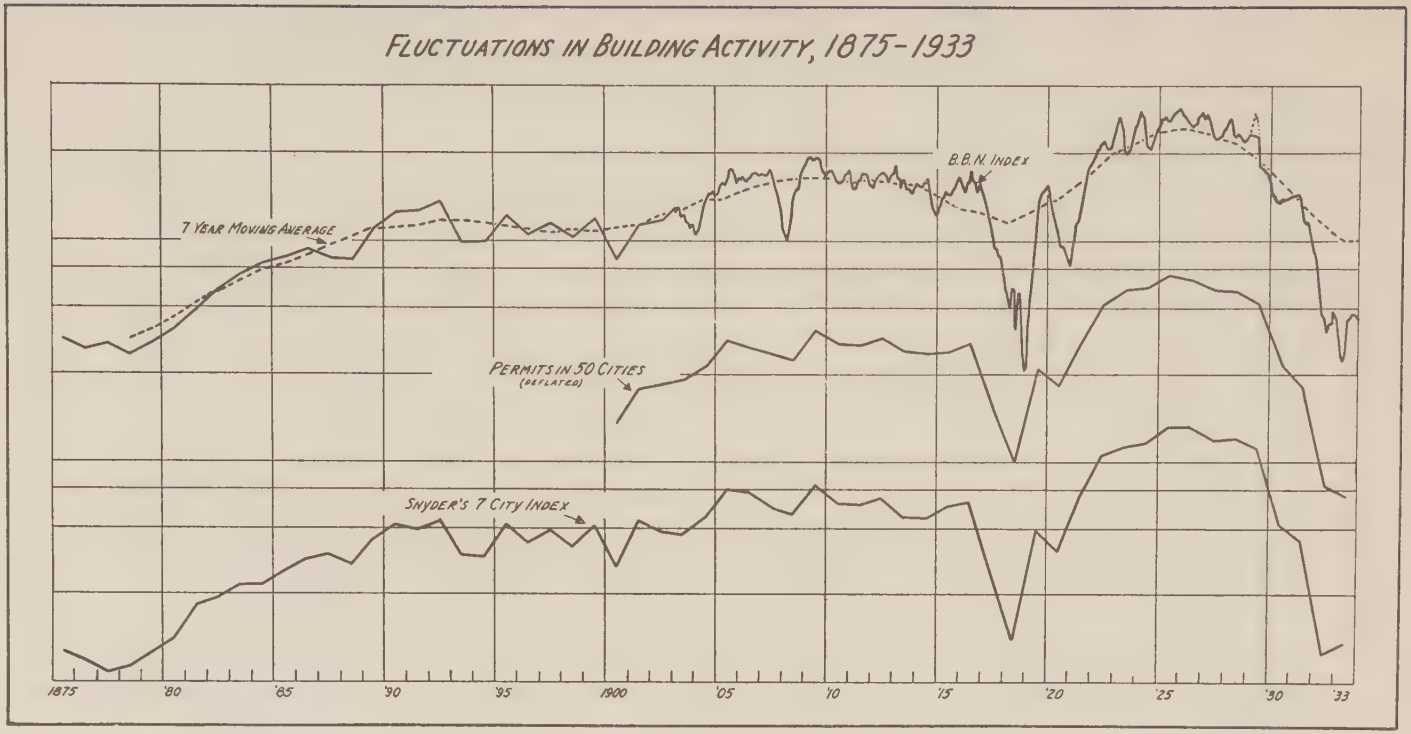
FLUCTUATIONS IN BUILDING ACTIVITY, 1875-1933
B.B.N. INDEX
7 YEAR MOVING AVERAGE
PERMITS IN 50 CITIES
(DEFLATED)
SNYDER'S 7 CITY INDEX
1875
'80
'85
'90
'95
1900
'05
'10
'15
'20
'25
'30
'33

FIG. 1

cessor, was completed during the time of the World War, when building was at an unusually low level; and the third major cycle took place during the fifteen years following the war, reaching its conclusion, we hope, in 1933.

As a means of measuring these major building cycles, a seven-year moving average of the B.B.N. index was computed.[5] This long-term moving average was used in preference to a least-squares trend line because the flexibility of the moving average permitted it to conform to the major swings; whereas no regular secular change was evident which might have been measured by one of the more simple least-squares lines. A seven-year period was chosen as being shorter than the major changes in building; yet about twice as long as the average Mitchellian

TABLE I

MAJOR CYCLES IN BUILDING ACTIVITY

Phase of Major Cycle	I	II	III
Turn from decline to rise....	1876–77*	1897–99	1917–18
Rise.....	1877–92	1900–1908	1918–24
Turn from rise to decline....	1892–93	1908–12	1925–26
Decline.....	1894–97	1912–17	1926–33

* While the B.B.N. index extends back no farther than 1875, 1876–77 was considered a major low on the basis of building activity in Chicago and real estate activity in San Francisco, Los Angeles, and St. Louis during the preceding decade.

business cycle. The major cycles in building activity shown by this moving average are given in Table I.

Evidence that these major cycles in building activity are a basic phenomenon, rather than aleatory, is found in similar fluctuations of real estate activity. Hoyt discusses real estate cycles covering fifteen to twenty years or more in his book on *One Hundred Years of Land Values in Chicago*.[6] Wenzlick records similar cycles for St. Louis,[7] and Maver-

[5] For the period from 1903 through 1933, monthly values were found by computing an eighty-three months' moving average of the monthly B.B.N. index figures. Extrapolation of the basic series was necessary to bring the moving average through 1933.

[6] University of Chicago Press, 1933.

[7] "Problem of Analyzing Local Real Estate Cycles," *Journal of the American Statistical Association*, March, 1933, pp. 201–6.

ick finds comparable major fluctuations in real estate activity in Los Angeles and in San Francisco.[8] Moreover, such major swings in an economic series are not a newly discovered phenomenon. These major cycles in building are essentially like the secondary secular trends emphasized by Kuznets in his *Secular Movements in Production and Prices*,[9] and Burns's trend cycles rest upon the same sort of underlying change.[10] There can be no doubt that these major cycles in building activity are characteristic and fundamental, and that their causes must be given careful consideration.

While major cycles are perhaps the outstanding characteristic of the building-activity index, there are also many other fluctuations. Aside from month to month changes (the significance of which is highly questionable), "minor cycles," generally lasting for several years, are clearly discernible. These comparatively minor fluctuations are best studied in terms of deviations from the seven-year moving average, thus eliminating trend (if any) and major cycles. Minor fluctuations, i.e., deviations from the moving average of the B.B.N. index, are charted in Figure 2 and given in Table IX.

Careful examination of the series of minor fluctuations reveals eleven minor building cycles having an average length of almost five years.[11]

[8] "Cycles in Real Estate Activity," *Journal of Land and Public Utility Economics*, May, 1932, pp. 191–99, and February, 1933, pp. 52–56.

[9] Boston: Houghton Mifflin Co., 1930.

[10] *Production Trends in the United States since 1870* (New York: National Bureau of Economic Research, 1934).

[11] The determination of minor cycles was, of course, arbitrary. In general, minor cycles are defined by two characteristics: (1) the length of the cycle from peak to peak and from trough to trough must be greater than one year; (2) any high must be at least 140 per cent of the preceding and the following low. Exceptions were made for 1885, which was called a high on the assumption that the 25 per cent rise in the annual data was as significant as a 40 per cent rise in monthly data, and for March, 1931, which was also called a high because there was a persistent movement of a year's duration against the trend of the times, raising the index 35 per cent above the preceding low. One further word of explanation:

August, 1928, was considered as the high in the 1924–30 cycle, in place of March, 1929. A pending multiple-dwelling bill in New York occasioned a rush for building permits, the greater portion of which never materialized in actual building construction. Both permits outside New York City and building contracts clearly indicate 1928 higher than 1929.

Table II gives the date of the high and low for each of these cycles, and also the length of each cycle and each up-swing and down-swing. Somewhat more time was spent, on the average, in advancing from lows to highs than declining from highs to lows. This is true even if the two exceptionally long periods—the rise, 1879–85, and the decline, 1909–14—are eliminated on the grounds that they should not be con-

TABLE II

MINOR BUILDING CYCLES

DATES		LENGTH (IN MONTHS)		
Highs	Lows	Low to High	High to Low	Total Cycle (Low to Low)
	1879			
1885	1888	72	36	108
1892	1893	48	12	60
1895 or 1899*	1900	48	36	84
February, 1903	January, 1904	32	11	43
August, 1905	February, 1908	19	30	49
March, 1909	November, 1914	14	68	82
June, 1916	November, 1918	19	29	48
December, 1919	December, 1920	13	12	25
February, 1923	July, 1924	26	17	43
February, 1928	March, 1930	43	25	68
March, 1931	March, 1933	12	24	36
Average		31.5	27.3	58.7
Average, excluding 1879–85 and 1909–14		27.4	23.2	50.7

* The year 1897 was used as the high point for purposes of computing lengths.

sidered parts of minor cycles. There appears some tendency for minor cycles to become shorter in duration and greater in amplitude with the passage of time, but the evidence on this point is far from conclusive.

Before seeking possible explanations of these major and minor building cycles, as such, it will be well to consider the fluctuations of building activity in relation to business cycles.

Business cycles and building activity.—Students of business cycles have given attention to the building industry on the assumptions that (1) the large expenditures involved in building vary widely from year

to year, and (2) there is a tendency for changes in building activity to precede changes in business volume. It is pertinent to inquire what light the B.B.N. index of building activity throws on this commonly accepted notion of the importance of building to business cycles.

Using the American Telephone and Telegraph Company index of business activity as a guide to business cycles,[12] we are impressed first with the absence of major fluctuations comparable to the major cycles in building. Undoubtedly the major building cycles do affect the shape and the duration of business cycles, but it is the minor fluctuations in building which correspond in nature and time limit to business cycles. For this reason it is the minor building fluctuations which are chartered with the American Telephone and Telegraph Company index in Figure 2.

To make the connection between building and business cycles clearer, each business cycle was divided into four phases and the condition of the building industry noted for each of these phases. This comparison, summarized in Table III, shows a clear tendency for building to precede business in assuming a direction which business was later to take. Always since 1903, and almost always before that time, building was rising, or at least level, when business turned for the better; and, contrariwise, building was falling or level when business turned down. In only four instances did business change to a direction contrary to that prevailing in building; these four exceptions occurred in the earlier years when data were available for annual intervals only and the coverage was less inclusive. Further evidence of the definite inclination for building to turn before business is found in the increase of the correlation coefficient from +.27 to +.67 when business is lagged three months behind building.[13]

[12] This index was selected because (1) it is presented as a continuous monthly series extending back through 1877; (2) it corresponds closely with W. C. Mitchell's guide post dates of business cycles; and (3) it does not emphasize prices as strongly as do some of the other indexes. The series from 1877 to 1928 may be found in Homer B. Vanderblue, *Problems in Business Economics* (2d rev. ed.; New York: McGraw-Hill Book Co., 1929), p. 783. Figures for the last few years had to be estimated from the Federal Reserve Board index to industrial production.

[13] Correlation coefficients were computed on monthly data, 1903–33. For the period from 1904 to 1929 the lag of up-turns in business behind those in building averaged 3.6 months, ranging from 0 to 7 months; the lag at down-turns averaged 7.5 months and ranged from 0 to 21 months.

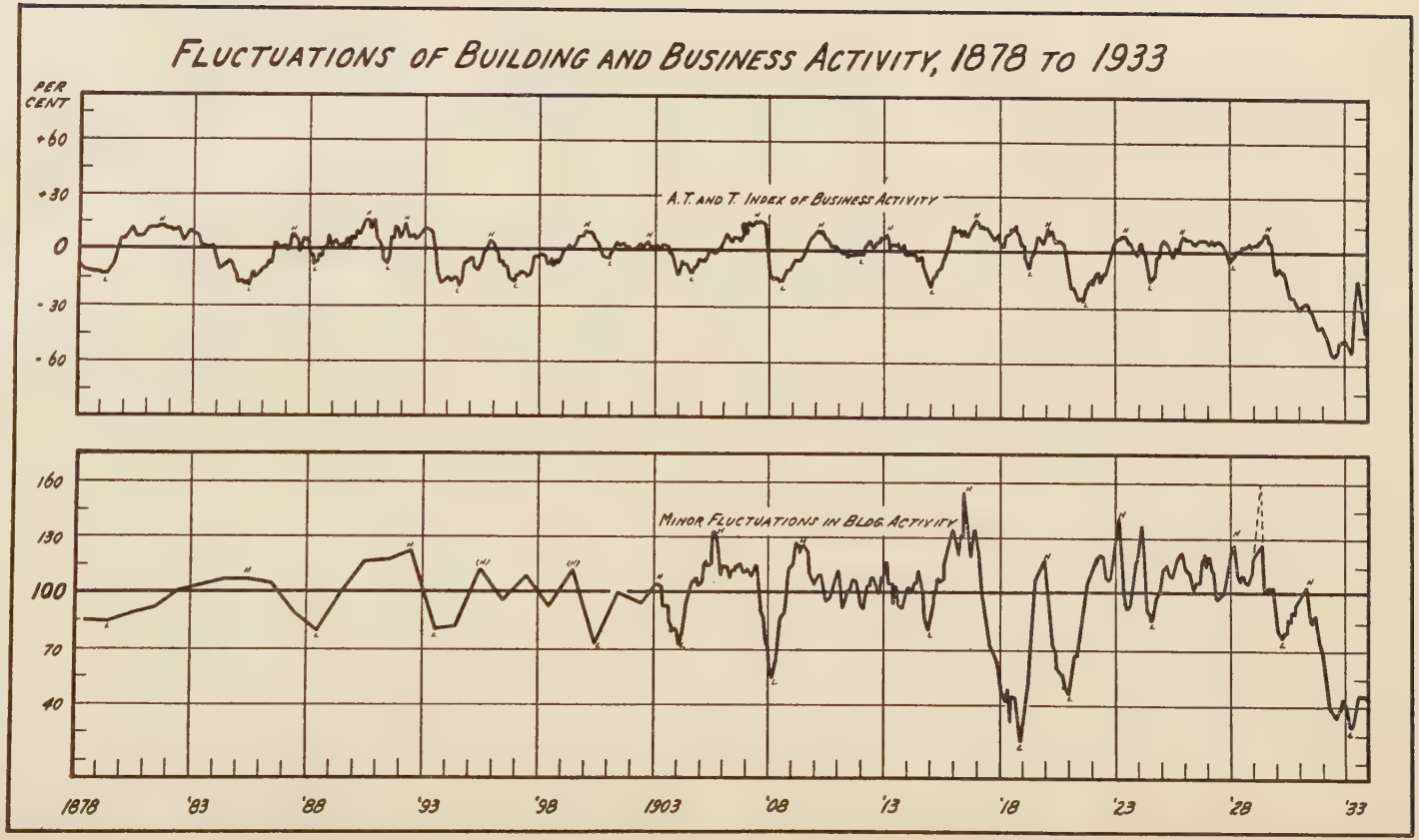
FLUCTUATIONS OF BUILDING AND BUSINESS ACTIVITY, 1878 TO 1933
PER CENT
+60
+30
0
-30
-60
A. T. AND T. INDEX OF BUSINESS ACTIVITY
160
130
100
70
40
MINOR FLUCTUATIONS IN BLDG. ACTIVITY
1878
'83
'88
'93
'98
1903
'08
'13
'18
'23
'28
'33

FIG. 2

The tendency of building activity to have turned before business changed direction might explain the "mixed" movement of building during upswings and downswings of business. At this point, however, Table III presents an inadequate picture, for the "mixed" classification covers up much fluctuation in building volume which has no counterpart in business activity. In fact, there is considerable independence of movement between the two series, which is possible despite the neat relationship discussed above, because of (1) variations in lags between

TABLE III

RELATION OF BUILDING ACTIVITY TO BUSINESS CYCLES

Phase of Business Cycle	Direction of Building			
	Rising	Level	Falling	Mixed
Turns up	9	5	1	..
Turns down	3	2	10	..
Up-swings	6	0	0	9
Down-swings	2	0	3	10

Phase of Business Cycle	Level of Building		
	High	Same	Low
Turns up	2	7	6
Turns down	9	3	3

high points and low points, (2) disproportionate amplitudes of minor movements, and (3) absence of major cycles in business comparable to those found in building. Private building, then, is not the only, or always the dominating, element in business cycles.

To sum up: In comparing building activity with business cycles two features stand out: one is the critical importance of the direction of building volume at turning-points in business, and the other is the independence of the two series in minor movements and in whole cycles. These features support the conclusion that building fluctuations arise,

to a considerable extent, independently of "business cycles"; that the building industry is often of critical significance when the direction of business is in the balance; and, finally, that general business once under way in either direction may continue without regard to building through the force of other factors in the situation. Since private building is one of those highly dynamic sections of our economic life having an important bearing on business activity, considerable effort should be devoted to seeking out causes of fluctuations in its volume.

CHAPTER III

BUILDING COSTS AND FLUCTUATIONS IN BUILDING ACTIVITY

In this chapter, consideration is given to those factors bearing on the supply of new buildings. Since new buildings are usually erected on special order, rather than for stock, fluctuations in the supply price are to be found in variations in the costs of production. These variations in building costs are among the factors controlling construction activity. In his book on *Industrial Depressions*,[1] Mr. George Hull makes the positive assertion that "*high price of Construction is the real, original, and under-lying cause of the mysterious industrial depressions which have occurred in the industrial nations when these depressions have come in the absence of external and recognized causes.*"

For purposes of analysis it is convenient to classify building costs into four groups, namely, materials, labor, land, and miscellaneous expenses, which include such items as management and architect's fees, depreciation of equipment, and selling expenses. For residential building the average relative importance of these groups is roughly: materials, 36 per cent; labor, 24 per cent; and land and miscellaneous expenses, 20 per cent each.[2]

Land.—While all buildings are necessarily associated with land, there is some question whether land should be included as a cost of building. Under perfect omniscient competition, land values would be the sum of discounted future services. Thus, if the land is engaged in its highest economic use, and assuming funds may be secured at the same rate used in discounting the future services, the entrepreneur is indifferent to the cost of the land, since any such cost will give a proportionate return. Such assumed conditions, however, are not present;

[1] (New York: Frederick A. Stokes Co., 1911), p. 130. Italics are Mr. Hull's.

[2] See *Construction Industry* (Washington: Government Printing Office, 1933), pp. 27 and 115; Gries and Taylor, *How To Own Your Home* (pamphlet by Division of Building and Housing, Department of Commerce, 1923), p. 12; and "Production of Low Cost Housing," *American Builder and Building Age*, June, 1931, pp. 80–85. For non-residential buildings the percentage for land is usually much higher.

especially is society not omniscient, and fickle public sentiment may cause fluctuations in land values which are not justified by prospects of future return. These fluctuations in land values do affect the amount which must be invested by the owner of a new building, and therefore may influence the quantity of work undertaken.

The market in which land values are determined is unorganized and transacts, by cumbersome legal machinery, infrequent exchanges of individualistic goods—goods with which the owners are often loath to part. As a result, "real estate as a commodity is the last to feel the rise due to boom times and is last to feel the effects of bad times."[3] In his unique study of *One Hundred Years of Land Values in Chicago*[4] Hoyt found that cyclical changes in land values tended to occur after cyclical changes in building activity.

These studies and other available evidence on changes in land values indicate: (1) Building booms are not initiated by variations in land values; but (2), since land values tend to follow a major rise of building activity, they contribute to the profitability of building transactions and thus become a cumulative factor in such a boom. (3) Excessive land values, reached after the boom has continued for some time, are eventually found to have no counterpart in increased earnings, and therefore contribute to the break of the building boom; and (4), since land prices are slow to move downward, they tend to increase the severity of the decline in building activity.

Miscellaneous expenses.—Unfortunately, there is available no evidence on the relation between fluctuations in miscellaneous expenses and variations in building activity. A small part of this item probably does not have short-time fluctuations, being a standard charge for professional service. On the other hand, the supply of many of these miscellaneous items is probably inelastic, since the specialized training and experience of the men involved act as a "sunk cost," and therefore the charges should vary with the volume of building activity. In any case,

[3] W. H. Wheelock, "The Effects of the Present Financial Situation upon Real Estate," *Harvard Business Review*, April, 1931, p. 312.

[4] Chicago: University of Chicago Press, 1933. See also Roy Wenzlick, "The Effect of Fundamental Economics on Real Estate Investments," *Proceedings of Mortgage Bankers Association, Twentieth Annual Convention, October 10, 1933*, p. 4; B. Snyder and R. W. Roby, *Fundamentals in Real Estate* (New York: Harper & Bros., 1927), pp. 142 and *passim*.

these miscellaneous expenses will not be the motivating element—the leaven—in cyclical fluctuations. Contractors will not raise their profit margin and write off more depreciation on equipment in times of building depression, nor is it likely that they will take a smaller margin of total expenses when building volume is high and business easily found. Rather, these miscellaneous expenses will have a definite tendency to increase when building activity is high and decrease when activity is low.

Guides to materials and labor costs.—In contrast to data on land values and miscellaneous expenses, figures for materials and labor costs are much more abundant. It is common practice to combine these data on materials and labor costs into a single "building-costs" index; and such an index has been used in the present study. Nevertheless, to be certain that the composite index did not cover up significant relationships, separate indexes for materials prices and labor costs were also compared with the fluctuations in building activity. The following indexes were employed:

Costs of building materials: The Bureau of Labor Statistics has compiled an index for wholesale prices of building materials, from 1890 to date, and Warren and Pearson have extended this series back into the eighteenth century.[5] While this index is an average of wholesale instead of retail prices, and while its components are not weighted exactly according to their importance in building construction, detailed study does show that it is a satisfactory guide to changes in building-materials costs.

Building-labor costs: Adequate measurement of variations in labor costs is difficult because of changes in workers' efficiency and because quoted rates take no account of bonuses and extra pay for over-time. Nevertheless, a good indication of important changes in labor costs is given by an index based on the following: New York Federal Reserve Bank index of building wages, 1913 to date; Douglas' hourly earnings in the building trades, 1890–1913; and an index of wages in the building trades found in the Aldrich report, 1840–90.[6]

[5] See *Bureau of Labor Statistics Bulletin 543* or similar bulletins on wholesale prices, and G. F. Warren and F. A. Pearson, *Prices* (New York: John Wiley & Sons, 1933), pp. 25–27.

[6] See Standard Statistics Company bulletins or bulletins issued by the New York Federal Reserve Bank; Paul H. Douglas, *Real Wages in the United States, 1890–1926* (Boston: Houghton Mifflin Co., 1930), pp. 73–77; Nelson W. Aldrich, *Wholesale*

"Building-costs" index: A number of building-costs indexes have been computed for various purposes. The one used in this study appears to be the best available guide to private building costs; it is based on compilations of the American Appraisal Company.[7] This building-costs index is regarded as a satisfactory measure of cyclical changes in building costs, but it must be used warily as a guide to secular changes.

Building costs and fluctuations in building activity.—The building-costs index, charted in Figure 3, furnishes a means of testing the hypothesis that building volume varies inversely with building costs. Comparing, first, each phase of the *major* building cycles with the index of building costs, definite indications were found that changes in costs are not the cause of major building cycles. During the major movements of building, both up and down, costs typically followed an independent course, showing but a slight tendency to move with, rather than against, the direction in building activity. Likewise, at the major-cycle turns no grounds were found for believing that the direction and leves of costs was a crucial factor. Dividing the costs index by Snyder's general-price-level index gave a series which showed an even greater lack of relationship with major cycles; nor did consideration of wage. land materials separately give support to the popular hypothesis Building costs, then, do not explain major fluctuations in building activity.

In the comparison of *minor* building cycles and building costs, the direction of movement in costs was noted for each period in the eleven minor building cycles, and also the level of costs—in relation to the

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Prices, Wages and Transportation (Washington: Government Printing Office, 1893). Comparison of the indexes of building-labor costs and building-materials prices showed: (1) a clear secular rise of labor costs compared with prices of materials; (2) abstracting from this secular difference, similarity of major movements; (3) a definite tendency for materials prices to lead wage rates in major movements; and (4) frequent minor changes in prices of materials not found in labor costs.

[7] The index is given in Table IX. Study of other widely used indexes of building costs revealed: (1) similarity of major movements in all indexes, and (2) that as measures of private building costs the New York Federal Reserve Bank index of building costs overweights labor during recent years, and that the *Engineering News-Record* index gives too much weight to both labor and steel. Incidentally, any index based on fixed quantities will be misweighted at some time in a long period of years, owing to the tendency for the ratio of expenditures on labor and on materials to remain constant in spite of unequal secular changes in prices.

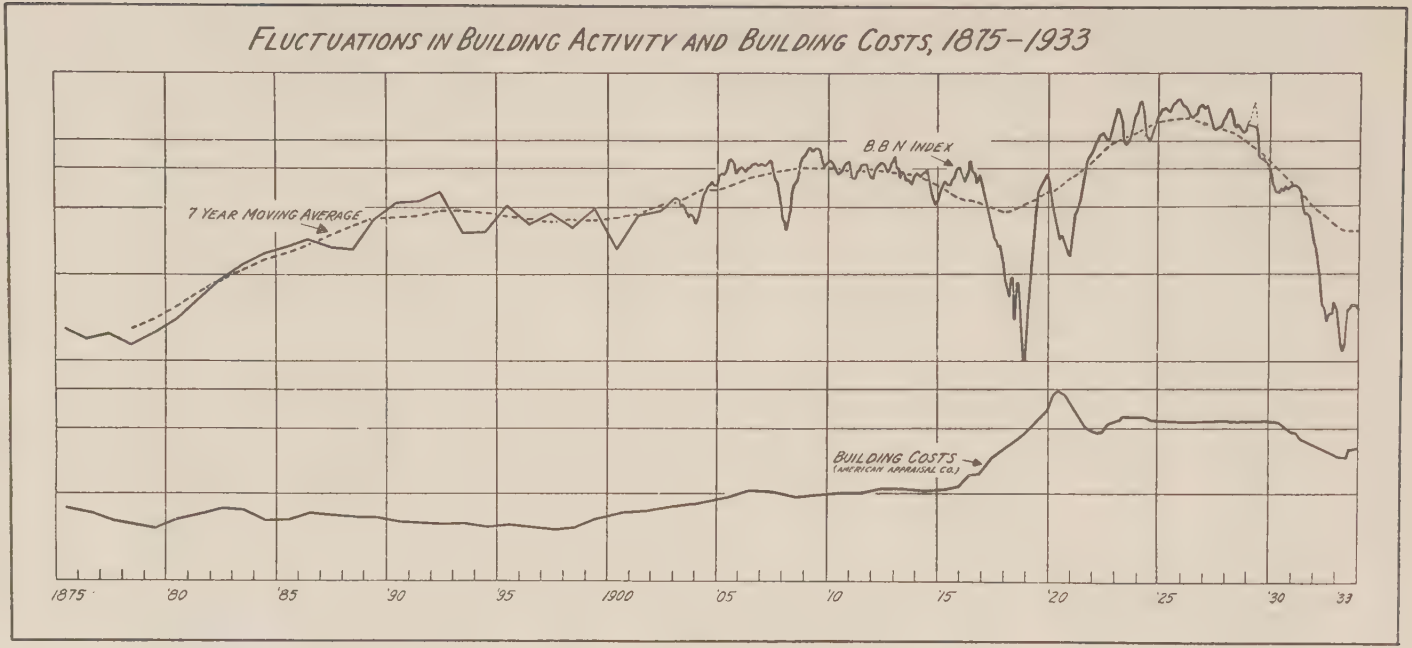

FLUCTUATIONS IN BUILDING ACTIVITY AND BUILDING COSTS, 1875–1933
B.B.N INDEX
7 YEAR MOVING AVERAGE
BUILDING COSTS
(AMERICAN APPRAISAL CO.)
1875
'80
'85
'90
'95
1900
'05
'10
'15
'20
'25
'30
'33

FIG. 3

preceding period—for each change in direction. The results (summarized in Table IV) are significant in their failure to show the expected relationships. In only three of the six classifications were tendencies evident. Rising costs during five of the eleven up-swings in building may indicate that increased bidding for factors of production raised costs; at least the rise in costs from levels which obtained during the previous decline often did not deter advances in building activity.

TABLE IV

BUILDING COSTS AND MINOR BUILDING CYCLES

PHASE OF BUILDING CYCLE	DIRECTION OF COSTS			
	Rising	Level	Falling	Mixed
Turns up	3	4	4	..
Turns down	6	3	2	..
Up-swings	5	1	2	3
Down-swings	4	2	1	4

PHASE OF BUILDING CYCLE	LEVEL OF COSTS*		
	High	Same	Low
Turns up	4	3	4
Turns down	5	2	4

* Level of costs is relative to previous building-cycle period.

It is at the turns downward that building costs may influence building activity. In the eleven minor cycles studied, costs had reached relatively high levels five times, and in six cases were moving still higher, when building started to decline. High and rising costs were not a necessary condition, however, to the reversal of a building boom, since in four instances costs were at low levels and twice were declining when building lost heart and turned downward.

This tendency for costs to rise with building activity, and to be high and rising when building turned downward, was also present when costs were adjusted for changes in the general price level. But here again the mere plurality of five instances out of eleven leads to the con-

clusion that even this connection is not fundamental to minor building cycles. If the foregoing comparisons between building costs and minor building cycles suggest any cause-and-effect relationship, it would be that fluctuations in building activity give rise to fluctuations in building costs, rather than vice versa.

The probable source of confidence some writers have in the hypothesis that changes in costs cause building fluctuations is found in the relation of materials prices and minor building cycles. As Table V indi-

TABLE V

BUILDING-MATERIALS PRICES AND MINOR BUILDING CYCLES

Phase of Building Cycle	Direction of Materials Prices			
	Rising	Level	Falling	Mixed
Turns up	1	3	7	..
Turns down	6	3	2	..
Up-swings	3	1	3	4
Down-swings	2	2	3	4

Phase of Building Cycle	Level of Materials Prices*		
	High	Same	Low
Turns up	2	3	6
Turns down	5	1	5

* Level relative to previous building-cycle period.

cates, the materials-price index reveals a more positive connection with minor building cycles than did the general-costs index. In six of the eleven cycles, materials prices were low and falling when building turned upward; and at the other turns, from advances to declines, prices were usually rising. While this behavior of prices at turns in building lends support to the hypothesis, it must be noted that often critical price-levels in one cycle were of no significance whatsoever in other cycles, and that prices showed no consistent connection with the up-swings and down-swings in building.

Since the materials-price index is not by itself an adequate measure of building costs, and since the more inclusive costs index does not show the same clear connection, we may conclude that rising materials prices at times of down-turns in building and falling materials prices at times of up-turns in building reflect an adjustment of prices to building activity rather than building activity to prices. In other words, the movements of wholesale materials prices are primarily an adjustment to changed conditions of demand; and these price movements are not of sufficient importance, relative to other factors, to determine the volume of building activity.

Summary.—Although statistical time series are lacking for two groups of costs of new buildings, namely, land values and miscellaneous expenses, it is not reasonable to believe that fluctuations in these costs initiate building fluctuations. Limited evidence does indicate that changes in land values may act as a cumulative factor in major building fluctuations and contribute to the instability at the close of great building booms. Fortunately, changes in building costs, meaning thereby an appropriately weighted index of materials prices and labor costs, can be estimated with some degree of accuracy. Comparison of an index of these building costs with fluctuations in the volume of building gives no support to the hypothesis that building costs are the controlling factor in constructional activity. While costs usually moved independently of building, such connection as was found suggests that changes in building activity cause changes in building costs, rather than vice versa. This does not mean that, other things remaining the same, costs will not affect building volume. It does show, however, that other factors in the situation were far more important than the level of building costs—so much so that the expected connection between costs and building was often reversed.

CHAPTER IV

THE RÔLE OF FINANCING IN BUILDING FLUCTUATIONS

Changes in rates on real estate loans.—A change in the rate of interest has a dual influence on decisions to invest in new buildings. The interest rate affects the amount of periodic payments made for the use of funds, and it is also employed in computing the present value of future expenses and receipts. In ideal equilibrium the rate used for both purposes would be identical; but in actuality the rate paid for the use of funds is subject to the many temporary influences which play upon the long-term money market; whereas the rate used in discounting future payments is much more stable, being an average of the contract rates anticipated for the period under question. Because the contract rate fluctuates more frequently and is the rate upon which most data are available, we shall discuss explicitly only its fluctuations. It is well to bear in mind, however, that changes may also take place in the discounting rate if the shifts in the contract rate are of sufficient duration and magnitude.

Satisfactory evidence on the contract rate charged for building loans is difficult to find. The financial markets in which these rates are determined are very imperfect. For real estate loans frequent use is made of the simple mortgage or mortgage bond, and these instruments are as individualistic as the properties which secure them. They usually provide for relatively small loans and may be sold only to persons or institutions who are in touch with local conditions. As a consequence, wide regional differences in rates charged on mortgages of equal security are a chronic condition.

Owing to imperfections of the real estate financial markets, changes in nominal rates occur infrequently. The United States Census reports approximately the same average rate on home mortgages in 1920 as in 1890;[1] and Hoyt found only eleven significant changes in nominal rates charged on new loans, secured by Chicago central business property,

[1] "Mortgages on Homes," *United States Census, 1920* (Washington: United States Printing Office, 1923), p. 171.

during a period of more than one hundred years.[2] The best available evidence on nominal rates since 1921 is the yields on new issues for land and buildings reported by the *Commerical and Financial Chronicle.* A weighted average of these yields shows a much greater stability than the index of yields on seasoned securities. The failure of these yields to adjust to changing financial conditions, especially during the recent depression, clearly indicates a strong rigidity in nominal rates.

Some flexibility in the rate charged borrowers is attained by the use of discounts or commissions, thus making the actual rate vary from the nominal rate. The usual adjustment to new conditions, however, is a change in supply of funds available at the customary rate, rather than a change in the price of funds. When the long-term money markets tighten up, only the higher classes of securities are issued; and when the markets are easy, financing of more questionable projects is done on the proverbial shoestring. In other words, an outstanding characteristic of real estate financial markets is a great variation in the availability of funds—a variation which is not reflected in nominal rates.

It is reasonable to believe that variations in the availability of long-term funds exercise a definite influence on the volume of building activity. To test the importance of this factor on building fluctuations in the past, a series indicating the ease or difficulty of real estate financing was needed. After careful consideration, Standard Statistics Company's high-grade bond yields, 1900–1933, and Macaulay's index of high-grade rail-bond yields adjusted to a negative slope,[3] 1875–99, were selected as satisfactory guides to conditions in the real estate money markets. The series is charted in Figure 4, along with minor fluctuations in building activity.

[2] *One Hundred Years of Land Values in Chicago* (Chicago: University of Chicago Press, 1933), p. 347.

[3] Prior to 1920 there was a tendency for the spread between yields on high-grade rail-bonds and yields on real estate loans to increase, the rail-bond yields falling below real estate loan yields. Therefore, to secure a series representing fluctuations in rates on real estate loans, the values of the rail-bond index were increased by $\frac{1}{100}$ for each year prior to 1920. This adjustment makes the rail-bond yields conform to the available evidence on nominal rates actually charged for real estate loans. Both the census figures on home mortgages and Hoyt's data for Chicago indicate that the change in slope should be made. Macaulay's index of yields on high-grade American railroad bonds and Standard's index of high-grade bond yields may be found in Standard Statistics Company, *1932 Base Book*, pp. 125 and 134.

Financial conditions and building fluctuations.—With all the talk about the importance of interest rates it is a reasonable expectation that some clear relationship will be found between long-term bond yields and building cycles. Comparison of the bond yields with the three major cycles revealed that in two of three instances low yields were associated with building recovery, and that rising yields accompanied two of the down-turns. The case is by no means clear, however, for (1) yields low in relation to levels existing in previous booms failed to stimulate activity; (2) at the close of the war building expanded rapidly in face of high and ever higher yields; and (3) in 1925 building reversed its upward journey without the slightest bidding from the financial markets. Thus, while there is some evidence that changes in long-term bond yields contribute to the major-cycle phenomenon, contradictory and independent movements between the yield and the building indexes frequently occur, necessitating some other explanation of these major swings.

In comparing long-term bond yields and minor building cycles, the method used was the same as that previously employed, i.e., the direction of movement of bond yields was noted for each phase of each minor building cycle, and also the level of yields at each turn. The results are summarized in Table VI, and comment on any particular point can be checked by the reader by referring to Figure 4.

This comparison shows that yields were generally rising when building declined; this was true nine times out of eleven. Not once, however, did building change direction from decline to advance while yields were still rising. The turn in building took place only after more favorable financial conditions were indicated by interest rates; six times bond yields were actually falling, and in the remaining five they were moving on a level.

The reverse was almost as true in the other half of the building cycle. Building up-swings occurred when yields were falling (five cases) or level (three cases), the one exception being in the boom immediately following the close of the World War, when building advanced in the face of persistently rising yields. Nor did building turn down until long-term yields had either leveled off or actually begun to rise, except in 1928, when building turned down four months before bond yields commenced to rise, and in the long, irregular period of the later 1890's.

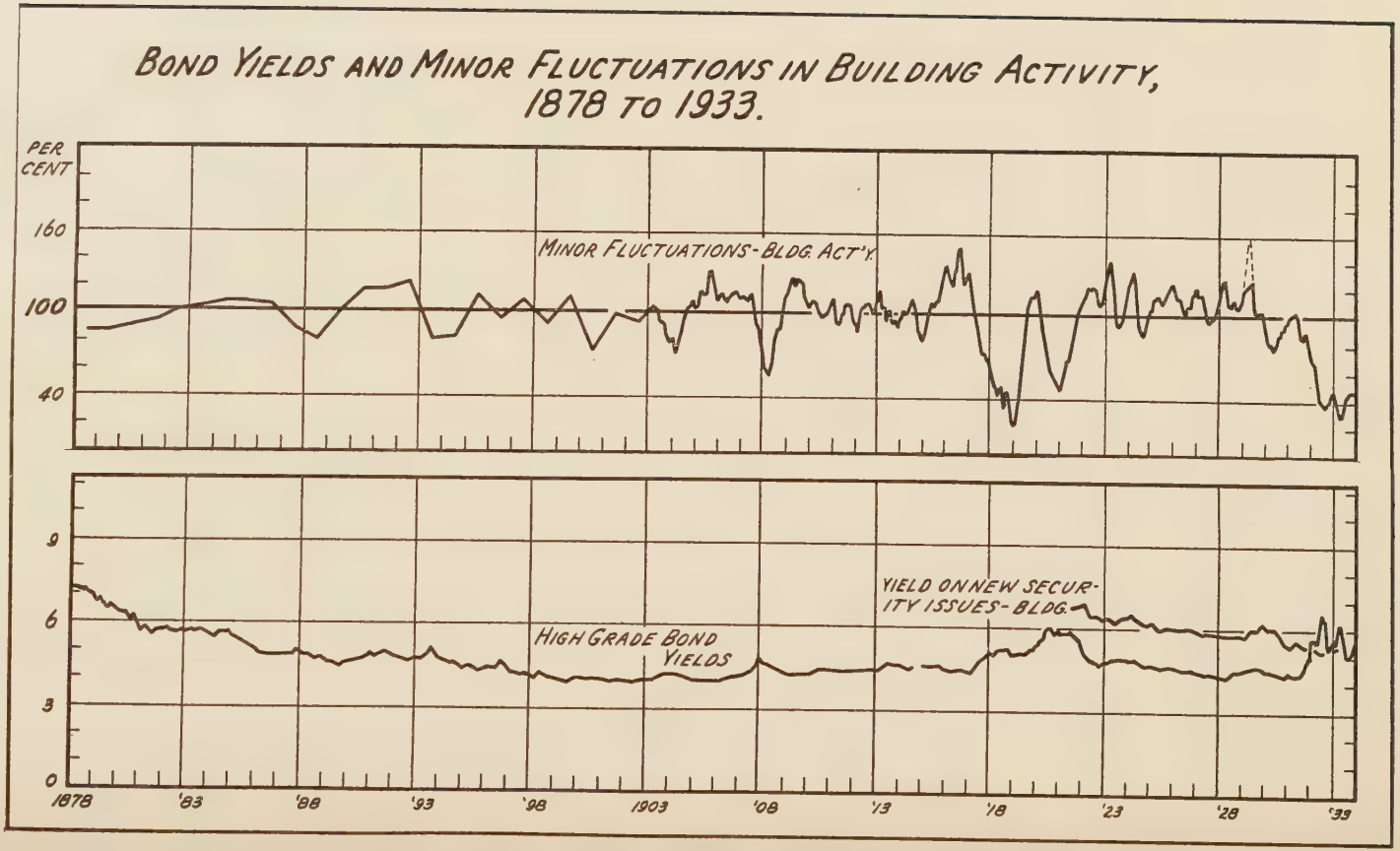

BOND YIELDS AND MINOR FLUCTUATIONS IN BUILDING ACTIVITY, 1878 TO 1933.
PER CENT
160
100
40
MINOR FLUCTUATIONS - BLDG. ACT'Y.
9
6
3
0
YIELD ON NEW SECURITY ISSUES - BLDG.
HIGH GRADE BOND YIELDS
1878
'83
'88
'93
'98
1903
'08
'13
'18
'23
'28
'33

FIG. 4

The typical relationship, then, is for building to advance when bond yields fall; to stop this advance, once yields have leveled off or started to rise; to decline as yields go up; and finally to turn from this decline to an advance, once yields have ceased to rise or have actually started downward.[4] From this typical relationship it follows that the level of rates should be the same or higher than in previous periods at the up-turns, and the same or lower at down-turns. This was predominantly

TABLE VI

BOND YIELDS AND MINOR BUILDING CYCLES

Phase of Minor Building Cycle	Direction of Yields			
	Rising	Level	Falling	Mixed
Turns up	0	5	6	..
Turns down	3	6	2	..
Up-swings	1	3	5	2
Down-swings	9	1	0	1

Phase of Minor Building Cycle	Level of Yields*		
	High	Same	Low
Turns up	8	2	1
Turns down	1	4	6

* Level of yields is relative to previous building-cycle period.

true, exceptions occurring only at the close of 1919 and the beginning of the first cycle studied, 1879.

While the connection between minor building cycles and long-term interest rates is clear-cut, it does not follow that a high correlation exists between the building-activity index and the bond-yield index. The connection is between directions of movement of the two, and this may

[4] Preferred-stock yields give the same general picture; and common-stock yields, while much more irregular, also show a similar prevailing tendency. To some extent this relationship of security yields and building is merely due to similar reactions, on the parts of building entrepreneurs and of bond investors, toward future possibilities. Nevertheless, it is extremely plausible to maintain that the changing attitude of investors causes changes in building volume.

be very good even though an absolute level of rates is not regularly associated with a given quantity of building. The correlation between annual building permits in seventeen cities, deflated, and an annual average of bond yields is $r = -0.4$; but monthly averages of yields plotted against monthly minor building fluctuations, 1903–33, show no significant connection whatsoever. This failure of absolute bond yields to correlate with the volume of building activity, despite the neat relationship found above, is readily explained on the following grounds: (*a*) building volume frequently fluctuated widely while bond yields remained level; (*b*) no mention was made of the amplitude of any movements; (*c*) because of this, falling yields in one cycle may have been—even at the lowest point—above the high for yields in another cycle.

Although no such thing as a normal or critical level of interest rates is evident the movement of bond yields was deeply significant as an indicator of conditions in the long-term money markets. The bond yields used in the comparison with building cycles related to seasoned securities already floated in the market, and the *direction* of movement of these yields, is probably a very good indicator of the ease or difficulty of floating new issues at that time. So long as yields were falling, new building could be financed with ease. Once the yields stopped falling, and especially if they commenced to rise, there was evidence that investors were becoming wary of the outlook for investments, and reluctant to subscribe to new issues. The rise of yields indicates an increased skepticism toward the future return from investments, and under such conditions less and less new building was financed. To complete the cycle, the volume of new building underwritten diminished until changes in monetary conditions and/or business outlook make long-term bond investments attractive; such a change resulted in falling yields on outstanding bonds and also increased willingness of the market to take on new issues.

Summary.—Changes in the rate of interest are important because they affect annual payments which must be made for the use of borrowed funds and also because the interest rate is used in discounting future payments. The actual market in which real estate funds are transferred and interest rates determined is very imperfect and strongly influenced by custom. Regional differences in rates on real estate loans are marked, and nominal rates in any region change infrequently.

Some adjustment to new (cyclical) conditions is made through modifications in discounts and commissions; but the predominant method of adjustment is a variation in the quantity of funds offered at the customary rate. Such shifts in the availability of long-term credits are indicated by the yields on high-grade bonds already circulating in the financial markets.

Major cycles in building activity are not explained by changes in money-market conditions. There is, however, a very significant relationship between bond yields and minor building cycles. Bond yields must indicate a willingness of investors to take on long-term commitments if building activity is to advance, and an unwillingness when activity contracts; moreover, before a change in the direction of building volume occurs, the money markets must have either already shifted direction or at least be moving on a level. It appears, then, that long-term financing conditions play a vital rôle in determining minor fluctuations in building activity. The extent of the response to such conditions varies, and calls for further explanation.

CHAPTER V

POPULATION GROWTH AND BUILDING FLUCTUATIONS

The idea that the total amount of building space and the total population tend to maintain a constant proportion is not only reasonable in theory but also has been demonstrated statistically. There was, for example, only a net change from 12.0 to 11.8 buildings per 100 inhabitants in Chicago while the population grew from 100 to 3,400,000.[1] It has been shown, moreover, that in Los Angeles the cumulated areas of types of buildings for different purposes each tended to maintain a proportion with total population.[2]

From this direct connection between the total supply of building space and population it follows that there should be a relation between the first differences of the two factors, i.e., new building should vary with population growth. To the new buildings erected to shelter new populations should be added the buildings necessary to replace the existing structures. For general purposes, then, total building activity may be divided into two groups: building for new population, and replacements or building for "old " population.

The connection between building activity and new and old population has been recognized by a number of students of the building industry, especially in estimating a building "normal."[3] It has, however, received entirely too little attention from most business-cycle analysts and those who seek to explain fluctuations in building activity.

In thinking of population growth, it is important to note that a decrease of population in one locality does not offset an increase in an-

[1] Homer Hoyt, *One Hundred Years of Land Values in Chicago* (Chicago: University of Chicago Press, 1933), p. 286.

[2] Henry Babcock, *Report on Economic and Engineering Feasibility of Regrading the Bunker Hill Area, Los Angeles* (Chicago: Wm. H. Babcock & Sons, 1931).

[3] See W. C. Clark, "Some Considerations Affecting the Long-Run Trend of the Building Industry," *Review of Economic Statistics*, III (1926), 47–52; Frank J. Hallauer, "Population and Building Construction," *Journal of Land and Public Utility Economics*, February, 1934, pp. 35–41; T. S. Holden, "Effect of Reduced Population Growth on Construction Demand," *Architectural Record*, January, 1932, pp. 3–8; Hoyt, *op. cit.*, p. 279 and *passim;* W. I. King, "Population Growth and the Volume of Building," *Quarterly Publications of the American Statistical Association*, January, 1924, pp. 9–13.

other locality. Because of the immobility of buildings, a migration of people within a nation or from the farm to the city may call forth new building activity in just the same way that a net rise in total population will. Therefore, in speaking of "population growth" we mean the sum of all increases in population, rather than a net change in total population.

The reason population growth assumes such a vital importance to the volume of building activity is found in the durability of structures erected. Because of durability, building for old population is small relative to existing supply, and also because of durability, the expenditure on building for new population is large relative to the increase in amounts annually offered for the use of buildings.

The idea that the magnitude and the growth of population are important to an understanding of fluctuations in building activity is subject to certain definite limitations. In the first place, population growth is itself the product of social and economic changes; at best we are only pushing back the frontiers of a vast and interrelated complex of forces. In the second place, even an accurate count of heads does not tell the characteristics of the population, the age distribution, the size of family, the proportion of negroes, or the economic abilities which may change so as to affect the quantity of new building needed. Finally, other influences, such as those considered in chapters iii, iv, and vi, also affect the volume of building. Nevertheless, a consideration of building activity in terms of (1) old population and (2) new population will contribute to an understanding of its fluctuations.

Building for old population.—In the United States, building for old population has been overshadowed by the intense activity required to house new and shifting populations. Nevertheless, the average annual building for replacement has been estimated at a billion dollars;[4] and as a greater number of buildings become old, this average is likely to increase.

It has been argued that the replacement of durable goods, such as buildings, is the basis of repeated fluctuations in business activity.[5]

[4] C. M. Wooley, "Making of Homes," *A Basis of Stability*, ed. Samuel Crowther (Boston: Little, Brown & Co., 1932), p. 227.

[5] The idea is stressed by the Norwegian economist, K. Schoenheyder, in "Produktionscykleme og Kriseme," *Statsokonomish Tadskrift*, Hefte II, III (1927), pp. 57–115. D. H. Robertson quotes, with approval, such an argument made by Karl Marx. See *A Study of Industrial Fluctuations* (London: P. S. King & Son, 1915), p. 36.

The theory is that, since the erection of buildings (durable goods) was originally concentrated in a short boom, so will these buildings wear out all at the same time, and their replacement automatically create another boom. This theory would hold true if all buildings had an equal and a fixed length of usefulness. Such is not the case. The life of a building varies depending upon its construction and materials. More important, the life of a building is not like the proverbial one-horse shay, lasting for a fixed number of years and a day. There is a period of time when decision to demolish and rebuild hangs in the balance and is determined by factors other than the age of the building. In other words, replacements are too diffused and flexible in time to be, by themselves, an initiatory cause of building fluctuations.

Another factor which might cause a concentration of building for old population is sudden innovation regarding habits of living or facilities demanded. Most of the innovations, such as a shift from large houses to small apartments, from privies to bathrooms, or from lamps to electric lights, are adopted gradually. More important, existing structures can often be adapted to changes by renovations and repairs. Thus the innovations may call forth a quantity of repair work, but they do not give rise to large amounts of new building immediately. The most important effect of innovations is to increase the rate of obsolescence.

Wilful demolitions of existing buildings occur either to make room for a different kind of structure, e.g., expansion of a business district, when the effect is to intensify an already started building boom, or in times of lax demand for building when dilapidated and obsolete structures are unable to find tenants, in which case new building is not immediately called forth.

In the replacement of old buildings, then, there appears no motivating force for building fluctuations. Replacements must, however, take place sooner or later; and if this building for old population does not necessarily occur at given times, a corollary is that it may be bunched (held back at one time and pushed forward at another), thus intensifying a boom or depression which has already been instigated by other factors.

Population growth and building cycles.—To test the hypothesis that changes in population growth may cause building fluctuations, comparable series with at least annual observations must be secured. Annual building-permits figures are available for a number of cities, but population totals—other than mathematical interpolations—are

gathered in most states only once every ten years. It is necessary, therefore, to have some index of population growth upon which to base intercensual estimates. Such an index of population growth which is available over a number of years and is most unbiased is school enrolment in the first eight grades. On the assumption that the ratio of total population over school enrolment will be approximately the same, one year to the next, annual population figures may be estimated from the school data.

For the present study, annual population series were secured for seventeen cities. Satisfactory series had already been computed for two cities, but it was necessary to make estimates from school enrolment data for each of the remaining fifteen. Growths in population were then computed by taking first differences in the population totals.

The seventeen cities are widely distributed geographically and represent a variety of economic activities and factors affecting population growth. The cities with the earliest date for which permits data were received are: Chicago and Boston, 1874; Detroit, 1880; St. Paul, 1883; Minneapolis, 1887; Milwaukee, 1888; Los Angeles, 1889; Buffalo, 1892; New Bedford, 1893; Philadelphia, 1894; Pittsburgh, 1897; Rochester, 1898; Nashville, Spokane, Syracuse, Baltimore and Portland, 1900. Population estimates for approximately the same years were also secured.[6]

The population-growth figures and the building permits were combined into two series covering the period 1875–1933.[7] A smoothed population-growth series was found by taking a five-year moving average of

[6] Permits figures were received directly from local building departments of fifteen cities; Mr. Carl Snyder furnished figures for Boston, and Chicago figures were taken from Hoyt, *op. cit.* School data were either received directly from city officials or taken from published reports. For some cities, total school enrolment, rather than enrolment in the first eight grades, had to be used. The method of estimating total population from enrolment figures is described in E. F. Young, "Estimating Population for Dynamic Communities," *American Journal of Sociology*, February, 1933, pp. 577–82.

[7] For the years prior to 1900 not all seventeen cities were represented. To adjust for this, the totals of the cities which were available were multiplied by a chaining factor. This chaining factor was recomputed each year. It is based on the ratios of (*a*) permits or population in all cities (actual or estimated) over (*b*) permits or population in those cities which are available in any given year, during the adjacent five years. The arithmetic mean of the middle three of these ratios was used as the chaining factor.

the yearly totals. The permits totals were adjusted for changes in building costs and smoothed with a seven-year moving average. These indexes of building activity and of population growth in seventeen identical cities are shown in Figure 5, and given numerically in Table X.

The population-growth index shows a number of year-to-year irregularities which probably are not significant. Some of these irregularities can be traced back to a single city. For example, the drop in population growth in 1925 is entirely accounted for by a drop in the estimated growth of Los Angeles. In other instances several cities combine to make an erratic rise or drop in the total. Such cases as these, the method itself, and full awareness of possible inconsistencies in the basic school data convince the writer that comparisons of any one year with a single other year are not to be regarded as meaningful. This necessary crudeness in the population estimates is probably one of the primary reasons why no relation is apparent between the minor fluctuations in building and population growth. The general movements of the population series, however, stand out so clearly that they cannot be explained away as aleatory.

Comparison of the major movements in the population-growth series and the building-permits series for identical cities reveals a very striking similarity. Both curves show three major cycles with approximately the same turning-points and of the same order of magnitude. Here, then, is strong statistical support for the hypothesis that the volume of building activity in a dynamic economy is greatly influenced by the underlying population movements. The relationship is particularly significant since the major changes of both series diverge from those of other economic series—noticeably in the 1890's and in the 1920's. The correlation between the two moving averages, 1878–1926, is $r = +.79$.[8]

There is a tendency for population growth to anticipate major changes in building activity by a year or two. While the year-to-year changes in the population-growth index cannot be regarded as conclusive evidence, the persistence of the population lead strongly suggests that it is typical and significant. Even if the exact timing of the major changes needs further evidence, there is no doubt that the re-

[8] During the last major down-swing, the lag of building behind population growth was unusually prolonged and the drop in population growth especially drastic. This explains why the correlation over fifty-three years, 1878–1930, is only $r = +.35$, while for forty-nine years, 1879–1926, it is $r = +.79$.

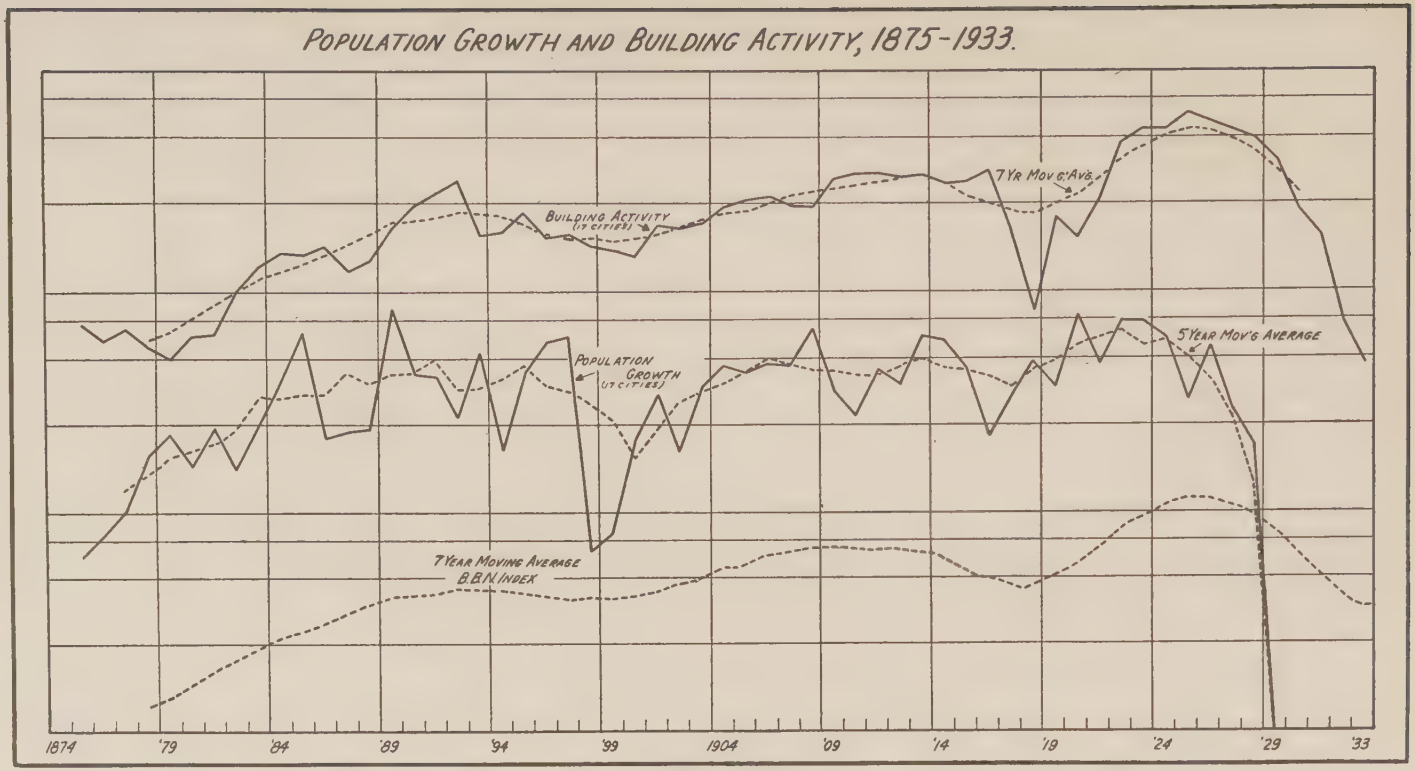
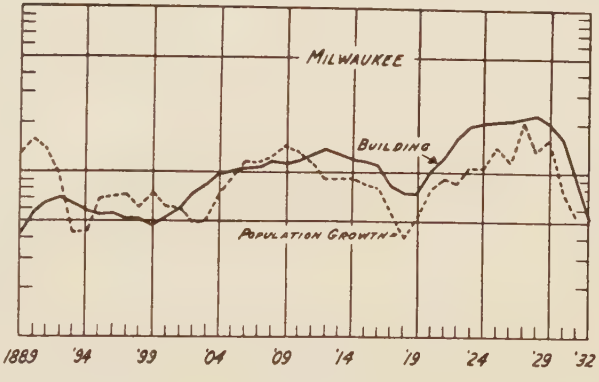
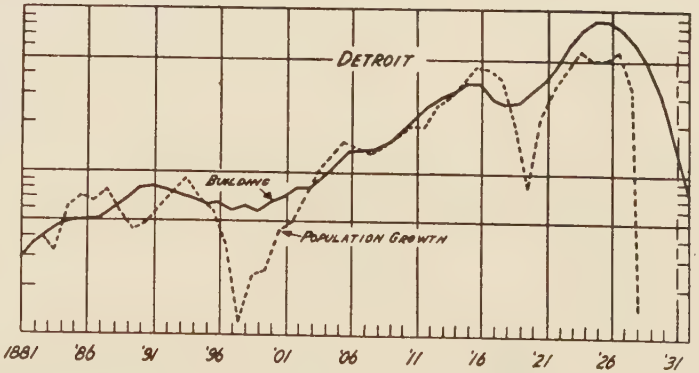

POPULATION GROWTH AND BUILDING ACTIVITY, 1875-1933.
BUILDING ACTIVITY (17 CITIES)
7 YR MOV'G AVG.
POPULATION GROWTH (17 CITIES)
5 YEAR MOV'G AVERAGE
7 YEAR MOVING AVERAGE B.B.N. INDEX
1874
'79
'84
'89
'94
'99
1904
'09
'14
'19
'24
'29
'33

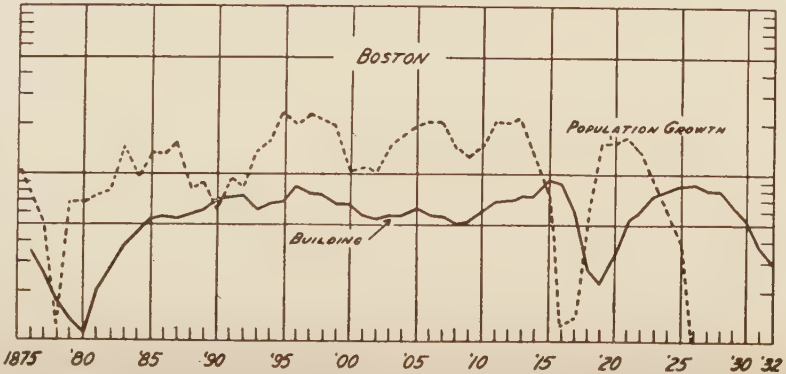
FIG. 5

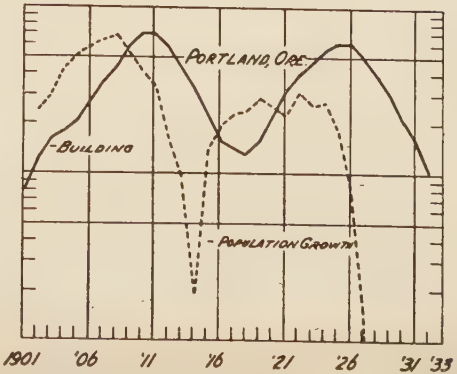
POPULATION GROWTH AND BUILDING ACTIVITY IN 4 SEPARATE CITIES

(MOVING AVERAGES)









markable similarity of the major cycles in the building and the population figures represents a basic connection between the two.

At the bottom of Figure 5, the seven-year moving average of the more inclusive B.B.N. building index is shown. The series representing population growth might very well be used to explain the fluctuations in this more inclusive building curve. It is worth noting that points where the seventeen-city building curve differs from the other building curve are readily explained in terms of population growth in the seventeen cities. This is true of both the more extended drop in the 1890's and the belated peak in 1913. This again suggests the fundamental relationship between changes in population growth and fluctuations in building activity.

Population growth and building in individual cities.—Since this study deals with the building industry as a whole, the totals for all seventeen cities have been used in the comparison of population growth and building activity. This was done in an attempt to average out idiosyncrasies of individual cities and get at underlying tendencies. The results showed population growth to be basic to major cycles in building activity. If population growth is basic for a group of cities, it should also appear in the data for individual cities.

Figure 6 compares population growth and building activity in four cities separately. The permits are deflated, and both series smoothed by three- or four-year moving averages. These data for individual cities are presented (1) to show that population growth is important to building in separate cities; (2) to illustrate the difference which is found between cities—a difference that is often explained by varying population growths; and (3) most of all, to make it clear that the correlation between building and population growth is not perfect for any single city. In a single city, population changes may occur and not affect building activity noticeably; and on the other hand, building activity may change while population growth is approximately level. The reasons for such divergencies need to be considered in each instance. Possible explanations include availability of capital, economic abilities of the new population, interboundary movements, general business conditions, legal restrictions in the form of zoning or housing laws, war regulations, age and characteristics of both the existing buildings and the existing population, and annexations. In other words, population growth is a very important factor to building activity but it is not the only factor.

CHAPTER VI

OTHER INDICATIONS OF CHANGES IN DEMAND FOR NEW BUILDINGS

Incomes and business activity.—One likely source of changes in demand for new buildings lies in variations of consumers' incomes. If the amount spent on housing is always a constant proportion of total incomes, and if the element of newness of new buildings makes them desired as are the less durable new goods, then building activity should fluctuate with incomes.

Either these assumptions are wrong or the National Bureau of Economic Research estimates of "incomes paid out," 1909–32, are inaccurate, for the total estimated incomes reveal no consistent relationship with major or minor building cycles. Probably this lack of relationship arises both from an insensitiveness of the income estimates and from an actual discrepancy between incomes received and new building. Expenditures for housing are rigid because housing is an article of conspicuous consumption and moving is inconvenient; moreover, housing is durable, and erection of new housing need not have a simple correlation with total housing expenditures.

Another commonly accepted indicator of changes in incomes is an index of general business activity. Building is, of course, one of the components of total business. Nevertheless, it is plausible to interpret variations in business activity as indicating changes in incomes of enterprises and individuals. On this assumption, movements of the American Telephone and Telegraph Company index of business activity were studied in relation to building cycles. (In chapter ii the dependence was reversed; there, building was observed in terms of business cycles.) No connection whatsoever was found between changes in business volume and *major* building fluctuations; but minor building cycles did show a relationship with business conditions.

The typical or modal relation of general business to minor building cycles was as follows: Building changed direction when business was at low levels and still declining. Once building recovery was under way,

business joined in the advance, both moving up together until business reached its normal or had moved well into high ground. Then as business flattened out, building reversed direction and started its downward journey. Sooner or later business joined building in its descent.

This typical cycle leads to the conclusion that business is not an initiatory factor in changing the direction of building activity, but that once the up-swings or down-swings of building are under way, business joins them as a cumulative factor. Such a conclusion must be regarded merely as "likely," since there are many exceptions to the typical relationship.

Rental rates.—Another indication of changes in demand for new building is the rental rates paid for the service of existing structures. Potential building owners probably assume that a rise or fall in current rents is a good guide to the long-run future demand for buildings, and act accordingly.

Unfortunately, information regarding rental rates is both scarce and unsatisfactory. Buildings are so individualistic that comparison of their rental rates is extremely difficult, even where the rates are known. Leases covering one to ten years avoid the resetting of rents in accordance with new conditions. Moreover, building owners are reluctant to lower rents for fear of spoiling their market; they prefer to let part of the building remain empty rather than lower all rents. For these reasons data on rental rates are not generally known and are difficult to interpret. The difficulties are just as real for the building owner as for the student, and go part way in explaining why the market for new facilities is often misjudged.

For use in the present study, an index of rental rates for low-priced dwellings, 1851–1933, was constructed from three other series.[1] This index is very sluggish in movement and shows no significant connection with major or minor building cycles. The lack of relationship was pri-

[1] The series are: Bureau of Labor Statistics cost-of-housing index, 1933–1913; Russell Sage Foundation rent index, 1913–1875, found in Carl Snyder, *Business Cycles and Business Measurements*, (New York: Macmillan Co., 1927); and 1875–1851, an index based on rental rates reported in J. D. Weeks, "Average Retail Prices of Necessaries of Life," *United States Census*, XX (1880), 104–7. The Real Estate Analysts have computed a rental index for St. Louis, 1851–1933, based on advertised rentals, but it has been published only in chart form. This index shows no significant relation to cycles in the B.B.N. building index.

marily due to the inadequacies of the basic rental data, and also to the fact that no account was taken of changes in building costs. Adjusting the rent index for building costs failed to uncover any connection between major building cycles and rents. When comparing the adjusted house-rent index with minor cycles, however, there appeared some evidence—none too clear—that building turns up when rents are rising; that the boom, once under way, disregards rent levels and expands in face of falling rents, and by the time building activity does turn down, rents are both low and declining. Even if this generalization is correct, the rent/cost ratio does not appear to be a controlling factor in building cycles.

Vacancy.—Vacancy is the cushion which expands or contracts with changes in demand, thus permitting a short-run stability in rental rates. Vacancy data, therefore, are important to the builder or the student as a guide to variations in demand.

Comparable figures on vacancy covering any number of years are exceedingly rare. Since 1924 the National Association of Building Owners and Managers has gathered reports on vacant office space. About all that can be safely concluded from these reports is that in the last boom commercial building activity continued despite an ever increasing percentage of vacancy. D. A. Wenzlick has presented a chart showing vacancy in St. Louis dwellings from 1900 to 1932.[2] The chart shows falling vacancy during the revival of building activity, and rising vacancy during the later part of a boom and the early stages of decline.

These relationships coincide with the conclusions from the comparison of adjusted house rents and minor building cycles. Some demand factors cause a rise in rents and fall in vacancies; building activity increases as a result; but once under way, building activity continues despite the warning of falling rents and rising vacancy. The supply of new structures which is created in excess of present demands will be absorbed only after a period of time—a period of time during which activity in the building industry must be at low levels.

Operating figures for existing buildings.—The influence of the various factors already discussed which indicate demand for new construction will be reflected in operating figures for existing buildings. Entrepre-

[2] "What About Rents?" *Journal of the American Institute of Real Estate Appraisers*, January, 1933.

neurs who contemplate investment in new buildings should consider the experience of existing structures as to gross income, operating expenses, and net income.

Published information on building operations—important, as it may be, to wise building decisions—is exceedingly scarce. For comparison with building cycles the writer combined operating figures from a number of identical buildings, 1906–32, into two sets of indexes—one set for commercial buildings and one for residential buildings. Indexes for gross rental incomes, operating expenses (including taxes), and net operating incomes were computed for both types of buildings; they are presented in Tables VII and VIII.

These indexes are subject to severe limitations. (1) The sample upon which they are based is obviously inadequate and is overweighted with Chicago buildings. (2) The use of identical buildings, which was necessary to give a homogeneity to the series, introduces a downward bias into the gross-rental and net-income indexes. Obsolescence and depreciation will place the buildings at an increasing competitive disadvantage as time passes. (3) Identical buildings are slow to reflect changes because of long-term contracts and inertia of tenants to move. The indexes do, however, furnish a rough measure of the operating experiences for a group of identical buildings over a fairly long period of time, and are presented for want of something better.

The movements of the gross-rental indexes and the operating-expenses indexes are too gradual to show any relation to minor building cycles. The commercial net incomes adjusted for changes in building costs and the residential net incomes (nominal or adjusted for building costs) did tend to be rising at times of minor building up-turns and falling at building down-turns. Thus there is some tendency for net operating incomes of existing buildings to move before similar changes in building activity. The comparison with minor cycles, however, is by no means clear-cut, for there were many times when builders acted on bases contrary to the experience of existing buildings.

In general, the operating indexes show more connection with *major* building cycles than was found with minor cycles. Gross rental incomes, for both commercial and residential buildings, rose ahead of building activity. At times the gross incomes also lead activity downward; but in other instances—especially in the 1920's—gross incomes

TABLE VII

Operating Indexes for Commercial Buildings*

1923 = 100

Year	Gross Rental Income	Operating Expenses	Net Operating Income	Net Operating Income ÷ Building Costs
1900	30	.....	.....	.....
1901	32	.....	.....	.....
1902	36	.....	.....	.....
1903	38	.....	.....	.....
1904	41	.....	.....	.....
1905	44	.....	.....	.....
1906	46	44	50	109
1907	46	40	50	109
1908	53	41	51	118
1909	54	45	62	139
1910	54	47	57	125
1911	54	48	53	117
1912	57	50	51	107
1913	57	53	53	111
1914	58	52	56	121
1915	57	52	59	124
1916	57	55	59	107
1917	58	60	56	83
1918	60	64	56	69
1919	62	75	56	56
1920	75	91	63	50
1921	87	93	71	74
1922	93	94	87	97
1923	100	100	100	100
1924	103	102	103	104
1925	104	105	102	107
1926	104	109	103	107
1927	105	112	92	96
1928	105	102	102	106
1929	102	106	92	95
1930	98	107	72	77
1931	92	104	46	57
1932	76	.....	20	28

* Each index is based on reports from identical buildings, but the same buildings are not used for all three indexes. The gross-rental-income index is based on reports from twenty-seven buildings, including large office and store buildings and lofts, in both central and outlying districts, chiefly in Chicago but also in New York City, Los Angeles, Cleveland, and Minneapolis. The operating-expenses index is based on sixteen buildings of the same type and distribution. The net operating income index is based on six Chicago buildings of the same variety of type and one Minneapolis building.

Figures for each building were first expressed as relative to the data for 1923, and then the relatives averaged, weighting each building equally.

remained at high level for a period after building activity had commenced to decline. This tendency for incomes of existing buildings to

TABLE VIII

OPERATING INDEXES FOR ELEVEN CHICAGO APARTMENT BUILDINGS*

1922–23 = 100

Year	Gross Rental Income	Operating Expenses	Net Operating Income	Net Operating Income ÷ Building Costs
1905–6	56	49	66	143
1906–7	55	50	63	132
1907–8	55	54	58	125
1908–9	57	50	67	146
1909–10	58	54	63	135
1910–11	58	57	59	125
1911–12	60	60	59	121
1912–13	60	63	55	113
1913–14	60	65	52	108
1914–15	61	60	64	131
1915–16	61	59	64	125
1916–17	60	68	48	80
1917–18	61	78	34	45
1918–19	63	81	34	38
1919–20	63	69	54	46
1920–21	76	82	66	54
1921–22	91	101	78	86
1922–23	100	100	100	100
1923–24	102	108	94	89
1924–25	108	109	107	107
1925–26	111	114	106	105
1926–27	112	115	109	108
1927–28	116	129	94	94
1928–29	114	111	119	118
1929–30	103	104	113	113
1930–31	89	91	88	97
1931–32	80	82	78	99

* The basic data for these indexes were supplied by Mr. Landon Lesch, office of the Business Manager of the University of Chicago. The indexes are relatives of the totals for all eleven buildings.

maintain high levels past the time when new buildings can fill their space at advantageous prices suggests one reason why construction activity often over-extends itself once a boom is under way. Unwary

builders, learning that gross rental incomes for certain buildings have not declined, are led to believe that additional space may be rented at satisfactory prices. At first only shrewd men see that new space would be a burden on the market. This becomes increasingly evident as time passes; and so eventually building activity does contract, but not quickly enough to prevent oversupplying the market.

Either the indexes of operating expenses are inaccurate or the current level of taxes and operating expenses is disregarded by builders, for no connection was apparent between the indexes and major cycles. It is quite possible that so much uncertainty is associated with the future demand for space that recent changes in operating expenses are, by themselves, of minor importance in the builder's decision to build or not to build.

Net operating incomes reflect the combined effect of all the factors bearing on demand and supply of buildings. It is not surprising, then, that the indexes of net incomes and major building cycles show a positive correlation. In a majority of cycle periods, the three series tend to correspond, with the net-operating-income indexes leading building activity at the turns. The most notable exception to this relationship was the strength of net incomes for residential buildings in the later 1920's.

Summary.—In this chapter it has been seen that general business activity is a cumulative element in minor building cycles; that changes in demand, as revealed in house rental rates and vacancies, probably influence builders at the close of depressions, but are disregarded once the industry becomes active; that part of the reason this handwriting on the wall is disregarded is the sluggishness with which gross and net incomes of already operating buildings reflect changes in demand for new space; but, finally, that in most instances building activity sooner or later adjusts itself to the level of net return on existing buildings.

CHAPTER VII

A PARTIAL EXPLANATION OF BUILDING FLUCTUATIONS

The purpose of this chapter is to recapitulate briefly the conclusions of preceding chapters by giving a partial explanation of building fluctuations. Not all fluctuations in *private* building activity can be accounted for in terms of the factors listed; nevertheless, the following is a consideration of elements basic to an understanding of these phenomena.

Major building cycles.—The first task is to explain the waves in building activity which last from fifteen to twenty years and are a movement underlying the shorter fluctuations in activity. Of prime importance to an understanding of these major cycles are shifts in population and the events associated therewith. Some alteration in the social order causes an increase of population in certain communities. These new people demand housing, and the economic activities which they create must be sheltered. It is not enough that the total supply of building facilities in the country be economically adequate for the total population; these buildings must also be located in the proper places. Since buildings are immobile and durable, a shift of population geographically is as important as an increase in the total.

These influxes of population are particularly vital to building activity because of the importance to building construction of *new* demand. There is intense activity in the relatively short period of time during which the goods are first created. Then, owing to the great durability of buildings, building activity falls to comparatively low levels, creating for replacements each year an average of but 3 to 4 per cent of the total supply. Should there be a sudden growth of population, of say, 9–12 per cent, and a corresponding increase in demand for building facilities, the activity in the building industry will be quadrupled (if possible) during that year. Thus, even if the replacements of buildings are distributed evenly in time, there may still be great fluctuations in building activity due to small irregular increases in total demand for

building facilities; and if the replacements are irregular, the fluctuations in activity are even greater.

The increased demand for building space caused by the inflow of new people bids up the price of existing facilities, and the profitability of these structures leads entrepreneurs to erect new ones. Thus the rise in the major cycle is under way. This rise will take place more readily if long-term funds are easily available, but the pressure for new buildings may be sufficient to outweigh even tight money-market conditions.

The important relation of population growth to building activity is not in itself a reason for fluctuations in building activity. Should there be a constant increment or constant rate of growth, then building volume would tend to follow a regular secular trend. In actuality the shifts in population occur in waves—waves which correspond very closely with the major building cycles. The innovation which attracted people to the new center spends itself or new counterbalancing influences arise, so that the population growth greatly diminishes or may even cease.

Building activity, however, does not decline immediately as the demand for new space begins to wane. For this adjustment to take place immediately would require a good competitive market, including, especially, omniscient buyers (buyers, since under a contract system such as prevails in the creation of new buildings, there is little production to stock on the part of producers). As a matter of fact, information about the supply and demand for new space is very scarce. Each building is distinctive, and thus there can be no quoted prices on a standard unit. Moreover, decisions to erect buildings are made quite independently, so there may be duplication in effort to satisfy any given demand. The process of erection consumes a period of time which allows current incomes to indicate a profitable return on buildings; yet the total supply of buildings including those under construction may be more than adequate to meet the demand. Added to this is the fact that incomes for existing structures tend to be maintained by leases and reluctance to move, even though the demand for new space has definitely declined. Finally, promoters of new buildings may be aware of the adequacy of existing space, as indicated in vacancy reports and rental concessions; yet unwary investors still subscribe to real estate securities and thus become the owners on the assumption that conditions in this very im-

perfect market are still as favorable as they were a year or more previous. All these things combine to perpetuate the activity in building beyond the time when population growth has ceased to expand. There is, then, a definite tendency for the building industry to continue a high level of production after the demand for additional space has turned down.

The resulting oversupply of building is quite significant, again, because of the durability of buildings. The buildings are neither perishable nor consumed with rapidity; rather, the excess space hangs over the market, deterring even building for replacement. Probably the momentary demand schedules for building space are inelastic, so that cutting of rental rates only aggravates the situation from a long viewpoint—the viewpoint of new building. The reduction of incomes of existing structures, because of vacancy and lower rental rates, often causes financial difficulties and foreclosures; and with properties available at foreclosure prices, there is little incentive for entrepreneurs to invest in new buildings. Thus the decline in building activity occurs not only because the demand for space has ceased to expand, or is expanding at a much slower pace, but because the situation is aggravated by the overexpansion of the preceding boom. Activity will continue at a low level until demand picks up, owing to another influx of population and/or, less likely, to an accumulation of needed replacements accompanied by easy long-term financing conditions.

In the foregoing paragraphs nothing has been said of costs of construction, i.e., supply price. While it is reasonable to expect an inverse relation between the level of building costs and the quantity of new building absorbed by the market, such is not the case. On these major swings the changes in demand outweigh the influence of building costs. Any decision to build involves a forecast of demand over a long period of years, and in such forecasts the margin allowed for error must be large. This intensifies the importance attached to changes in demand and makes cost changes of a few per cent relatively insignificant. If anything, building costs move with building activity, thus tending to mitigate fluctuations in the latter rather than to initiate or intensify them. The speculation and lagging rise in land values may contribute to the intensity of the building boom; but, by and large, major cycles

in building take place independently of the usual range of changes in supply price.

Minor building cycles.—Aside from the major building cycles just discussed, there are minor cycles in building activity which average four to five years in length and correspond in many respects to the Mitchellian concept of "business cycles." What has been said in the previous paragraphs about the intensity of building fluctuations due to the durability of buildings, and the imperfections of the market in which the volume of activity is determined, is equally applicable to minor cycles.

Contrary to the comparatively unimportant rôle played by financial conditions in the explanation of major cycles, the ease or difficulty of borrowing in the long-term money markets is important in the consideration of minor building cycles. Nominal interest rates are fixed by custom and change only occasionally; discounts and commissions are more flexible; but the element of real importance in the long-term money markets is found in the availability of funds at the standard rate.

Though the ratio of rents to cost may be rising, the prime and essential requisite of an up-turn in minor building cycles is an easing of financial conditions—a renewed willingness on the part of investors to take on new long-term loans. With funds again available, there are always a considerable number of projects waiting to be executed. This new activity in the building field stimulates general business, which in turn increases the demand for building space and also the confidence of long-term investors. Thus the rise is under way. Goods are being created (and their cost price distributed to factors of production) the services from which do not enter the market at all during the period of construction, and after that only gradually over a period of years. The availability of funds and the briskness of demand for building space favor replacement of old buildings which were demolished either in the previous depression or to make room for the new buildings. As individuals and enterprises become more prosperous, they are willing to pay a premium for the luxury of a brand-new domicile. All these factors assist the building industry to an increasing volume of activity.

There is, however, a tendency to overshoot the mark, especially since in the real estate market the "mark" is very difficult to discern. Rental

rates have probably ceased to rise and construction costs have gone up; so the rent-cost ratio is declining. This may continue for a time; but once plethora of funds is wiped out and the investors in long-term securities become skeptical, with a resulting difficulty in procurement of loans, then building activity reverses direction and starts its downward path. The declining activity in building helps to undermine the advance in business, and sooner or later general business also turns for the worse and becomes a contributory factor in the decline of the minor building cycle. This leaves the volume of new building again at low levels waiting for a readjustment of financial sentiment toward the future which will return the flow of funds to constructional enterprise.

In the preceding discussion a rather rigid distinction has been drawn between major and minor cycles in building activity for purposes of analysis. In reality they are closely intertwined and react on each other, e.g., the forces acting on the major cycle are also those which determine the height and depth of the minor movements; and even with both major and minor cycles taken into account, there remain the still smaller, irregular variations which also characterize the building data. In all these fluctuations, special and unusual circumstances which are not subject to generalization may alter the otherwise natural trend. Therefore any summary such as the foregoing can at best be but a partial explanation of building fluctuations.

CHAPTER VIII

BEARING OF CONCLUSIONS ON BUSINESS-CYCLE THEORY

The conclusions arising from our study of building fluctuations have bearing on certain theories of business cycles; these will be discussed briefly in the following paragraphs. The intention is neither to enter into a full discussion of the theories mentioned nor to embark upon the formulation of a new theory of business cycles. Even though the building industry may be an important sector of our economic society, it is no more than a sector, and one is not justified in generalizing about the whole economic structure on such partial evidence. It is altogether proper, however, to relate our findings to some of the pertinent theories, recognizing that they tell but part of the story.

First to be mentioned is the prevailing idea that building activity is one of the important factors in business-cycle phenomena. This idea has already been introduced in chapter ii; and, as pointed out there, the evidence clearly substantiates the claim. Fluctuations in building activity are important to business not only because of their violence and the magnitude of the expenditure involved but also because changes in building volume have a definite tendency to lead fluctuations in general business activity. Clearly, building is not the only element in the business-cycle picture, for there is considerable independence of movement between the two indexes (especially in regard to major building cycles); but a correlation of +.67, when minor building fluctuations are given a three months' lead, shows a significant relationship.

This connection of the activity in building with that in business is directly in line with the recent emphasis given to the "rate of investment." No one has more ably discussed the bearing of "investment" on business fluctuations than J. M. Keynes in his *Treatise on Money*.[1] He explicitly names buildings, along with transport and public utilities, as the main categories of long-term investment. We are not in a posi-

[1] New York: Harcourt, Brace & Co., 1930.

tion to test Keynes's principal hypothesis, since data are not available on savings or on public-utility construction. If, however, savings are assumed to accumulate at a constant rate, then the similarity of variations in business and building activity lends support to the theory that the prosperity of business is primarily, or at least initially, determined by the balance between savings and investment.

Once granting the prime importance of the rate of investment to business virility, the question of the cause of variations in the amount of investment immediately arises. In this connection changes in the rate of interest have been much emphasized. The interest rate is stressed by some writers for its influence on inventory policy rather than on investment policy.[2] Evidence presented in previous chapters does not relate to such theories except through the implication that investment in the heavy durable goods is really the important factor. Changes in the interest rate are also put forward as a controlling factor in quantity of durable investment. For example, Keynes states: "Almost the whole of the fixed capital of the world is represented by buildings, transport and public utilities; and the sensitiveness of these activities, even to small changes in the long-term rate of interest, though with an appreciable time lag, is surely considerable."[3]

Chapter iv was devoted to the relation of financial conditions to building activity. The tenor of the argument there was to the effect that the nominal long-term rate of interest applicable to real estate borrowing tends to be fixed by custom and to change infrequently. While some adjustment to the nominal rate may be made by discounts and commissions, the usual change in the long-term real estate money market is in the *availability* of funds. Thus, the business-cycle theories which hold that the quantity of investment depends upon those changes in the balance between discounted net incomes and present costs which arise from changes in the discount rate are based upon something that does not occur. In theory a change in the risks which will be assumed at a given price is equivalent to a change in the rate at

[2] See the earlier writings of Hawtrey and Fisher, e.g.: R. G. Hawtrey, *Good and Bad Trade* (London, 1913); Irving Fisher, *The Purchasing Power of Money* (New York, 1911). For a theoretical discussion of the "Influence of Interest Rates on Prices," and thus general business, see Knut Wicksell, *Economic Journal*, June, 1907, pp. 213–20.

[3] *Op. cit.*, II, 363.

which a given risk will be assumed, but in the realistic world the former change is made much more readily than the latter.

While the theories that argue a connection between the long-term interest rate and the rate of investment need to be re-phrased, they still point to a fundamental relationship. Taking changes in yields on seasoned bonds to indicate shifts in the availability of mortgage money, a very significant connection was found between financial conditions and minor building cycles. As long-term money became more plentiful, building activity expanded; and when money became scarce, building contracted. If the theories be interpreted in this revised fashion, then strong substantiation for them was found. It must be noted, however, that the foregoing relationship refers to minor building cycles, and that conditions in the long-term money market do not explain the major fluctuations in building. Ease or difficulty of financing go a long way in determining when building activity will change direction, but the net amount of the rises and declines (and thus the underlying or major movement) remains to be rationalized by some other group of theories of business fluctuations.

This leads us to that body of thought which emphasizes innovations as the *raison d'être* of fluctuations in physical production.[4] These theories are cast in a modern capitalistic setting, but ascribe to innovations the motivating rôle in business cycles. Evidence in the present study gives direct support to these claims. The major fluctuations in building activity were found to be closely associated with shifts in population; and these shifts in population are, of course, reflections of economic and social alterations which make a change of residence desirable to a large number of people. Because of the great durability of buildings, innovations which cause changes in demand for space assume a singular significance and are essential to an understanding of fluctuations in building activity.

Part of the reason innovations are so important to variations in activity is found in another line of thought about the nature of cyclical

[4] Cf. Joseph Schumpeter, "The Explanation of the Business Cycle," *Economica*, December, 1927, pp. 286–311; A. B. Adams, *Economics of the Business Cycle* (New York: McGraw-Hill Book Co., 1925); Mentor Bouniatian, "The Theory of Economic Cycles Based on the Tendency toward Excessive Capitalization," *Review of Economic Statistics*, May, 1928, pp. 67–79.

fluctuations. This is the theory which explains variations in activity in producers'-goods industries partly by variations in the *rate* of change of demand for the corresponding consumers' goods. For example, Robertson, with approval says,

> M. Aftalion points out that a small proportionate change in the demand for consumption goods may produce a large proportionate change in the demand for construction goods: for instance, supposing 10 per cent of the annual output of boots is produced by new machines, a rise of 10 per cent in the demand for boots will produce a rise of 100 per cent in the demand for new machines.[5]

The idea is frequently associated only with producers' goods; but, as J. M. Clark has pointed out,[6] the essential characteristic is durability, whether of producers' or consumers' goods. There is no technique for measuring accurately the rate at which consumers' demand for building changes, but certainly the principle stated in the foregoing quotation goes a long way toward explaining the violence of fluctuations in building activity.

Unfortunately, the lack of a precise measure of consumer demand for building space prevents a test of the more elaborate hypothesis that the lead in construction activity before general business is due to variations in the rate of increase of demand for buildings services. The only monthly series which may indicate changes in demand for building space (commercial and industrial demand directly, and residential demand indirectly through probable incomes available for purchase of housing) are indexes of general business activity. The failure of the rate of change in these indexes to reveal a connection with the volume of building activity does not substantiate the theory, but the measure is too crude to be regarded as evidence disproving the hypothesis.

Another popular theory regarding business cycles is that changes in production costs, through their influence on the profitability of operations, will cause inverse fluctuations in business activity. Following

[5] *A Study of Industrial Fluctuation* (London: P. S. King & Son, 1915), pp. 122–23.

[6] For specific reference to residential building see, "Business Cycles: The Problem of Diagnosis," *Journal of the American Statistical Association*, March, 1931, Supplement, p. 214.

this line of thought, some students believe that an increase in building activity can be attained only from a reduction in building costs. Plausible as the theory is, the present study found fluctuations in building activity to be independent of the level of building costs. In the past, changes in demand factors—real or anticipated—usually outweighed the influence of variations in costs of building.

Contrary to the usual analysis by economists, Warren and Pearson contend that falling costs of building by themselves will cause a great decline in building activity. Starting from "an ideal state of economic equilibrium,"

> . . . . if the costs of buildings should decline twenty per cent, a panic would ensue. . . . . [The man who is thinking of buying a home] will see his neighbors who have made small payments lose their equities. . . . . Builders, credit agencies, and home owners with small equities must sell. In such a situation, although costs of buildings decline only twenty per cent, it might be necessary to offer properties at twice this reduction. . . . . Most building would stop. . . . . If in such a period a way were found to still further reduce building costs, it would make the matter still worse, because properties would drop still further in value. . . . .[7]

Not only does the evidence of the present study fail to show any such connection, but there is a glaring fallacy in the argument itself, namely, that prices of existing buildings will fall with the costs of production of new buildings. Obviously, barring changes in demand (which are explicitly waived in this case), the price of existing structures will fall only as the building industry becomes active—not stagnant—and creates a much larger supply for the unchanged demand situation. There is no inseparable bond between all prices (as is too often assumed in monetary discussions); rather, the lower price of one commodity affects the prices of other commodities only in its bearing on their supply and/or their demand.

Finally, fluctuations observed in the building industry substantiate a business cycle theory expounded by C. O. Hardy and others. Because of the uncertainty of future events and also the uncertainty of concurrent action by other individuals responding to the same meager data on events in the recent past, overexpansion or overcontraction is likely to occur. The longer the period necessary to change the supply

[7] *Prices* (New York: John Wiley & Sons, 1933), p. 265.

brought onto the market and the more sluggishly the market reflects a change in supply or demand, the more extreme will be the overexpansion or overcontraction. Experience of the building industry clearly indicates that this element of uncertainty plays a part in fluctuations of activity. Especially on the upswing is there a tendency for building to overshoot the mark, and this is primarily due to a lack of certain information concerning both present conditions and activities as well as future events. Uncertainty does not of itself initiate building cycles, but it contributes to the extremes to which the fluctuations go.

In conclusion it must be repeated that the final word regarding full appraisal of a business-cycle theory cannot be drawn from the experience of a single industry. All that has been attempted is a review of the evidence of this study in terms of related cycle theories. It is hoped, however, that this analysis of fluctuations in the building industry has made a contribution which will assist others in the formulation of an accurate and useful theory of business cycles.

CHAPTER IX

POSSIBILITIES OF STABILIZATION

Numerous suggestions have been advanced for improvement of the building industry. Many of these are directed toward phases of the industry other than its fluctuations in activity. For example, the failure to provide adequate housing for low-income groups, the absence of modern production methods, the bidding practice, the methods of financing real estate, and a general lack of organization have all been sharply criticized and recommendations made for their correction. Commendable as many of these suggestions may be, our interest lies with those provisions which deal with variations in private building activity.

Stimulants to activity.—The present talk of "stabilization" in the building industry consists primarily of advocating devices for stimulating activity to levels which are regarded as normal. The stimulants proposed are varied and numerous, including means for easing financial borrowing and for lowering building costs. Only in the sense that activity is prevented from going into extreme depths of depression, however, may stimulants be regarded as stabilizing devices; they are not a solution to fluctuations in building activity. We have no assurance that the stimulants will be applied only in periods of depression and withheld in times of high activity. In fact, if the attitude exhibited in the past building boom is typical, stimulants will be used as readily in good times as in bad times, and probably more effectively.

Government building.—Another general suggestion for stabilization is that governments (federal, state, or local) should undertake construction of houses and other buildings when private initiative fails to maintain activity in the industry. Such building, while sometimes differentiated from other public works by the type of projects undertaken, is clearly of the same nature. The public-works program implicitly accepts fluctuations in private building activity and attempts to budget its volume to offset these fluctuations. A well-planned public-works

program is indeed desirable, but it is not a direct stabilizer of private building activity.

Subsidies.—In the realm between public building and private building is the scheme of providing public subsidies to private undertakings, such as have been granted in New Zealand and Germany.[1] Subsidies have some advantages in administration and also in the fact that initiative and supervision rest on private individuals. They do not, however, escape many of the questions arising under a public-works program such as the limit to which government expenditure should be carried and the matter of forecasting future economic events; nor do subsidies provide a check to booms in private building activity. Moreover, by stimulating activity at one time, subsidies may reduce the quantity of private building which would otherwise contribute to recovery at a later date.

Financial control.—Aside from the use of governmental funds for building during periods of depression, there have been few specific suggestions for cyclical control of real estate loans. The extensive discussion of monetary regulation of cyclical fluctuations is confined to possible action of a central bank. Central bank action does not deal directly with the financing of new building, for (*a*) other factors besides building activity must be considered by the central bank board; (*b*) the bank action influences primarily the short-term money rates, and any effect on availability of mortgage money must arise indirectly as changes in short-term rates affect yields on existing long-term securities and these yields on seasoned securities in turn affect the markets for new issues; and (*c*), because of the localized and imperfect markets for building loans, any action in the central markets will be felt but slowly by a major part of the building industry. For these reasons, there is likely to be a discrepancy between the desires of the central bank board and actual conditions in the financing of buildings.

A further limitation on financial control of building fluctuations is that monetary conditions are not the only factor determining these fluctuations. Major cycles in building appear to be independent of the trends in the financial markets; so it is only the minor cycles which

[1] See "Building Subsidy and Building Activity in New Zealand" and "New Provisions for Public Subsidies for Building in Germany," *Monthly Labor Review*, December, 1933, pp. 1456–58.

could presumably be affected. Nevertheless, while admitting that the existing devices for financial control of building fluctuations have very serious limitations, changes in the availability of funds do have some influence, and efforts toward control in this direction are to be desired.

Budgeting.—There are some who feel that the decisions to build cannot be left to private enterprise. J. M. Clark in his recent book concludes that building activity (and other production of durable goods) can be stabilized only by a system of budgeting:

> The primary method of procedure is to budget capital outlays on a regularized schedule which provides sufficient reserve capacity for all ordinary peaks of demand, and which refuses to be stampeded by the momentary state of the market into violent speedings-up or slowings-down. This is not an easy task.[2]

In other words, stabilization is to be accomplished by a central planning board which apparently has the power to decide when and where building should take place in accordance with a long-run budget of expenditures. The creation of such a device certainly should avoid cyclical fluctuations in building as we know them. In fact, it would sooner or later involve a regimentation of production virtually incompatible with a competitive system of private enterprise. The setting-up of budgets in one industry inevitably affects other industries; and if production of all durable goods is to be budgeted, there would remain few segments in our economic society unaffected by the procedure. The ramifications and political pressures resulting from such public regulation can be readily appreciated. The basic question is not so much whether this method would stabilize activity in the building industry, as whether that stability would be worth its price.

Competition.—A final suggestion for the reduction of fluctuations in building activity is the enforcement of effective competition. Pullen argued for this form of control in 1685:

> But this is certain, that there are no more houses built every year than is occasion for: because there are tenants for the houses, when built, and a continuance every year to build more. For the builders will do as other traders, who, when the market is overstocked with their commodities, and no occasion for those already made, forebear to make any more, or bring them to market till a new occasion requireth them. And when they find they cannot

[2] J. M. Clark, *Strategic Factors in Business Cycles* (New York: National Bureau of Economic Research, 1934), p. 196.

lett those already built, they will desist from building, and need no Act of Parliament to hinder them.[3]

If competition is to determine the volume of new building, a number of modifications of existing conditions should be made. For one thing, some central agency should assist builders in estimating how many houses there is "occasion for." This would involve the collection and dissemination of information on rental rates paid by new tenants, vacancies, buildings under construction, foreclosures, and indications of population shifts. Moreover, effective competition calls for publication of prices paid for materials and for contract jobs. Finally, competition should be enforced in all sectors of economic enterprise; that is, the prices of building materials, building labor, and goods made in buildings should be determined competitively rather than by monopoly or partial-monopoly decision. In such a competitive system, fluctuations in building activity would still occur, due to the irregularity of progress, but the amplitude of the swings would be mitigated by a more accurate and a more flexible adjustment to changing conditions.

The New Deal for building.—Included in the great quantity of New Deal legislation are a number of bills which directly or indirectly concern the building industry. Many of the provisions are still to be put into operation,[4] and this is not the place to discuss them in detail. For the purpose of a brief summary the New Deal changes can be listed under three categories:

1. Reforms of methods and practices (irrespective of cyclical fluctuations in activity). Included here are the new provisions for small mortgage loans and mortgage insurance, i.e., the National Mortgage Associations, the Federal Savings and Loan Associations, the Mutual Mortgage Insurance, and the Federal Home Loan Banks. Also noncyclical in effect is the reform of competitive bidding practices for construction contracts.

2. Stimulants to building activity. The primary stimulation to private building arises from the adoption of the new financial measures at this time; once they are put into operation, there should be an initial easing of credit for home construction. The action of the Home Owners Loan Corporation indirectly stimulates new building (again of small homes) by lessening foreclosure sales and easing the financial stress.

[3] *An Apology for the Builder* (London, 1685), p. 15.

[4] This section is being written in November, 1934.

The insurance against loss on house-modernization loans has the possibility of inducing lending for this purpose; and a small quantity of government funds will be supplied for new building through the recently created Savings and Loan Associations. Except, however, as the organization set up in the code for the construction industry may collect and disseminate information about building conditions, there are no forms of cyclical control provided.

3. Limitations and hindrances. The greatest limitation of the new provisions is that all financial improvement is limited to small loans. The erection of projects of less than $16,000 in value is, of course, only a part of total private building. A further limitation is that the provisions are complicated and will take considerable time to get them functioning properly. Finally, the New Deal has introduced certain hindrances to building activity in the Securities Act, in higher costs resulting from codes and from public-works expenditures, and in its tendency to restrict innovations and population shifts which are so crucial to building activity. In the writer's opinion, these hindrances have, thus far, offset any favorable influence of the governmental stimulants to private building activity.

Summary.—The suggestions of means for stabilizing the vast fluctuations in the building industry are not encouraging. In the main, a choice must be made between (*a*) budgeting production which involves the regimentation, and to a considerable extent the stagnation, of economic life, and (*b*) fluctuations in activity arising as a consequence of an uneven rate of progress. If the first alternative is refused, there remain some methods by which fluctuations can be mitigated though not eliminated. A central banking system can influence the long-term money rate (given sufficient time and resources) and thus stabilize to some extent the minor building fluctuations. Secondly, competition can be made more effective by disseminating knowledge of current conditions and prices and by eliminating monopoly price-fixing. Finally, if fluctuations in private building activity are recognized as typical occurrences, public expenditures for construction can be timed so as to lessen the effect of these fluctuations on the general business structure. At the present time neither a definite nor a consistent policy is being followed. Recent legislation is clearly of the patchwork variety, consisting chiefly of stimulants fostered regardless of their ultimate bearing on a planned or a free enterprise economic system.

STATISTICAL APPENDIX

TABLE IX

INDEXES OF BUILDING ACTIVITY, 1875–1933

(1) Date	(2) Permits Index (Seasonally Adjusted 1920–30 = 100)*	(3) Building-Costs Index (1913 = 100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913 = 100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1875	5.4	81	20	.....	.....
1876	4.6	78	18	.....	.....
1877	4.5	72	19	.....	.....
1878	4.0	69	17	20	85.0
1879	4.1	66	19	22	84.7
1880	5.4	72	22	25	89.0
1881	6.7	76	27	29	92.4
1882	8.9	81	33	33	100.6
1883	10.4	81	39	37	103.6
1884	10.5	72	44	41	107.2
1885	11.2	72	47	44	107.3
1886	12.9	77	51	48	105.3
1887	11.8	76	47	53	88.4
1888	11.2	74	46	58	79.4
1889	15.4	74	63	63	100.0
1890	17.5	71	75	64	116.9
1891	17.6	70	76	65	117.2
1892	19.3	69	84	69	122.3
1893	12.6	69	55	69	80.7
1894	12.2	67	55	67	82.0
1895	16.5	68	73	65	113.3
1896	13.3	67	60	63	95.8
1897	14.5	65	67	61	109.1
1898	12.7	66	58	63	92.1
1899	16.7	72	70	62	112.5
1900	11.6	76	46	64	72.3
1901	17.0	78	66	66	100.1
1902	18.4	81	69	73	94.5
1903					
Febr.	21.8	83	79.5	75.5	105.2
Mar.	21.8	83	79.5	76.1	104.4
April	21.9	84	78.9	76.4	103.2
May	19.8	84	71.3	77.0	92.5
June	20.4	84	73.4	77.6	94.6
July	20.2	84	72.5	78.2	92.7
Aug.	18.7	84	67.4	79.2	85.1
Sept.	18.5	84	66.5	79.8	83.3
Oct.	17.8	85	63.1	80.7	78.3
Nov.	18.6	85	66.2	81.6	81.1
Dec.	18.2	85	64.7	82.5	78.4

* Permits index is based on *Bradstreet's* "Building Permit Values, 120 Identical Cities," 1911–33; Babson's "Monthly Values of Building Permits in 20 Cities," 1903–10; Ayres's permits in fifty cities, 1900–1902; and permits data from thirteen cities, 1875–1900.

† Building-costs index is the American Appraisal Company's "Building Construction Costs," 1913–33; and an arithmetic average of the American Appraisal Company costs indexes for frame, brick, and reinforced-concrete buildings, 1900–1913; and an average of the frame- and the brick-building-costs indexes, 1875–1900.

TABLE IX—*Continued*

(1) Date	(2) Permits Index (Seasonally Adjusted 1920–30 = 100)*	(3) Building-Costs Index (1913 = 100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913 = 100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1904					
Jan.	16.7	85	59.2	83.4	71.0
Febr.	17.4	85	61.9	84.0	73.7
Mar.	18.7	85	66.5	84.6	78.6
April	20.9	86	73.4	85.2	86.2
May	22.8	86	80.1	85.5	93.6
June	23.5	86	82.5	85.8	96.1
July	24.7	86	86.7	85.8	101.1
Aug.	25.7	86	90.3	85.8	105.3
Sept.	25.9	87	90.0	85.5	105.3
Oct.	26.9	87	93.4	85.5	109.2
Nov.	25.8	88	88.5	85.8	103.5
Dec.	26.0	88	89.1	85.5	103.9
1905					
Jan.	26.9	89	91.2	86.1	106.0
Febr.	29.4	89	99.7	86.4	115.4
Mar.	30.3	90	101.8	86.7	117.4
April	29.7	90	99.7	87.3	114.2
May	30.5	91	101.2	87.9	115.1
June	32.2	91	106.9	88.5	120.8
July	35.3	91	117.2	89.1	131.5
Aug.	36.0	92	118.1	89.7	131.6
Sept.	35.0	92	114.8	90.6	126.7
Oct.	33.7	93	109.4	91.5	119.5
Nov.	30.8	93	100.0	92.1	108.5
Dec.	33.3	94	106.9	93.0	114.9
1906					
Jan.	33.1	94	106.3	93.7	113.5
Febr.	33.8	95	107.6	94.6	113.7
Mar.	32.9	95	104.5	95.2	109.8
April	32.8	96	103.3	95.8	107.9
May	34.1	96	107.3	96.1	111.6
June	34.3	97	106.9	96.7	110.6
July	35.7	97	111.2	97.0	114.6
Aug.	35.9	97	111.8	97.6	114.6
Sept.	36.4	97	113.3	97.9	115.7
Oct.	35.7	97	111.2	98.5	112.9
Nov.	35.0	97	109.1	98.8	110.4
Dec.	35.7	97	111.2	99.1	112.2
1907					
Jan.	35.5	97	110.6	99.4	111.2
Febr.	35.1	97	109.4	100.0	109.4
Mar.	34.8	97	108.5	100.3	108.1
April	36.3	97	113.0	100.9	112.0
May	37.5	97	116.9	101.5	115.2
June	35.8	97	111.5	102.1	109.2
July	32.8	97	102.1	102.7	99.4
Aug.	29.9	96	94.0	103.3	90.9
Sept.	29.1	96	91.5	103.6	88.3
Oct.	25.9	96	81.6	103.9	78.5
Nov.	24.0	95	76.4	103.9	73.5
Dec.	19.7	95	62.5	104.2	60.0

TABLE IX—*Continued*

(1) Date	(2) Permits Index (Seasonally Adjusted 1920–30 = 100)*	(3) Building-Costs Index (1913 = 100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913 = 100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1908					
Jan.	18.7	94	60.1	104.5	57 5
Febr.	17.4	94	55.9	104.8	53.3
Mar.	19.6	93	63.7	105.1	60 6
April	21.1	93	68.6	105.4	65.0
May	25.2	92	82.8	105.4	78.5
June	27.3	92	89.7	105.7	84.9
July	28.8	92	94.6	105.7	89.4
Aug.	28.6	92	94.0	105.7	88.9
Sept.	31.1	92	102.1	105.7	96.6
Oct.	35.5	93	115.4	105.7	109.1
Nov.	36.9	93	119.9	105.7	113.4
Dec.	37.3	93	121.1	105.7	114.6
1909					
Jan.	39.0	93	126.6	105.7	119.7
Febr.	40.7	93	132.3	105.7	125.1
Mar.	41.1	93	133.5	105.7	126.3
April	39.9	94	128.1	105.7	121.1
May	40.4	94	129.9	105.7	122.9
June	41.5	94	133.2	105.7	126.0
July	40.5	94	130.2	105.7	123.1
Aug.	40.2	94	129.3	106.0	121.0
Sept.	36.9	94	118.7	106.0	112.0
Oct.	35.4	95	112.7	106.0	106.3
Nov.	34.5	95	109.7	105.7	103.7
Dec.	35.4	95	112.7	105.7	106.6
1910					
Jan.	35.9	95	114.2	105.7	108.0
Febr.	36.5	95	116.0	105.4	110.0
Mar.	36.0	95	114.5	105.4	108.6
April	34.9	96	110.0	105.1	104.6
May	33.0	96	103.9	104.8	99.1
June	31.8	96	100.0	104.8	95.4
July	32.1	96	100.9	104.5	96.5
Aug.	32.5	96	102.7	104.2	98.0
Sept.	33.3	96	104.8	104.2	100.6
Oct.	34.9	96	110.0	104.2	105.5
Nov.	35.7	96	112.4	103.9	108.1
Dec.	37.0	96	116.3	103.9	111.9
1911					
Jan.	33.8	96	106.3	103.9	102.3
Febr.	30.3	96	95.5	103.9	91.9
Mar.	30.3	96	95.5	103.9	91.9
April	31.9	96	100.3	103.9	96.5
May	33.2	96	104.5	103.9	100.6
June	33.2	96	104.5	103.9	100.6
July	36.1	97	112.4	104.2	107.8
Aug.	36.0	97	112.1	104.5	107.2
Sept.	35.9	97	111.8	104.8	106.6
Oct.	34.2	98	105.4	104.8	100.6
Nov.	31.9	98	98.5	105.1	93.7
Dec.	31.6	98	97.3	105.1	92.5

TABLE IX—*Continued*

(1) Date	(2) Permits Index (Seasonally Adjusted 1920–30 = 100)*	(3) Building-Costs Index (1913 = 100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913 = 100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1912					
Jan.	31.3	99	95.5	105.1	90.8
Febr.	33.4	99	101.8	105.1	96.8
Mar.	35.6	99	108.8	104.8	103.7
April	36.5	100	110.3	104.8	105.2
May	37.4	100	113.0	104.5	108.1
June	37.7	100	113.9	104.2	109.3
July	37.4	100	113.0	104.2	108.4
Aug.	35.7	100	107.9	103.6	104.1
Sept.	33.9	100	102.4	103.3	99.1
Oct.	34.4	100	103.9	102.7	101.2
Nov.	36.9	100	111.5	102.4	108.8
Dec.	36.9	100	111.5	102.1	109.2
1913					
Jan.	40.1	100	121.1	102.1	118.6
Febr.	34.9	100	105.4	101.5	103.9
Mar.	35.6	100	107.6	101.5	106.0
April	31.5	100	95.2	101.2	94.0
May	34.6	100	104.5	100.9	103.6
June	33.7	100	101.8	100.9	100.9
July	31.2	100	94.3	100.6	93.7
Aug.	31.8	100	96.1	100.3	95.8
Sept.	30.3	100	91.5	100.0	91.5
Oct.	29.9	100	90.3	99.4	90.9
Nov.	31.3	99	95.5	99.1	96.3
Dec.	32.0	99	97.6	98.2	99.1
1914					
Jan.	33.6	99.0	102.4	98.2	104.3
Febr.	32.1	99.0	97.9	97.6	100.3
Mar.	31.7	99.0	96.7	96.7	100.0
April	32.8	98.2	100.9	96.1	105.0
May	32.9	98.2	101.2	95.2	106.3
June	34.8	98.2	106.9	94.3	113.5
July	32.2	98.2	99.1	93.7	105.8
Aug.	29.7	98.2	91.2	92.7	98.4
Sept.	25.9	98.2	79.8	92.1	86.6
Oct.	24.8	99.0	75.8	91.2	83.1
Nov.	23.8	99.0	72.5	90.3	80.3
Dec.	24.7	99.0	75.2	89.4	84.1
1915					
Jan.	26.0	99.0	79.5	88.2	90.1
Febr.	28.2	99.0	86.1	87.3	98.6
Mar.	28.8	99.0	87.9	86.4	101.7
April	30.6	99.4	93.1	85.5	108.8
May	29.7	99.4	90.3	84.6	106.8
June	30.1	99.4	91.5	83.4	109.8
July	29.4	100.0	88.8	82.5	107.7
Aug.	31.9	100.5	95.8	81.6	117.4
Sept.	32.6	101.0	97.6	80.7	121.0
Oct.	34.6	101.5	103.0	79.8	129.2
Nov.	35.7	102.0	105.7	78.9	134.1
Dec.	36.4	102.7	106.9	78.2	136.7

TABLE IX—*Continued*

(1) Date	(2) Permits Index (Seasonally Adjusted 1920–30 = 100)*	(3) Building-Costs Index (1913 = 100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913 = 100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1916					
Jan.	34.9	104.0	101.5	77.9	130.2
Febr.	33.7	106.0	96.1	77.6	123.7
Mar.	33.2	108.0	92.7	77.3	119.9
April	37.2	110.0	102.1	77.3	132.0
May	37.7	112.0	101.8	77.0	132.2
June	43.7	113.9	116.0	77.0	150.6
July	39.2	114.0	103.9	76.7	135.4
Aug.	38.5	114.5	101.5	76.4	132.8
Sept.	34.6	115.0	90.9	76.1	119.4
Oct.	37.1	116.0	96.7	75.8	127.5
Nov.	39.2	117.0	101.2	75.2	134.5
Dec.	37.7	118.4	96.1	74.9	128.2
1917					
Jan.	35.2	122.0	87.3	74.3	117.5
Febr.	33.2	125.0	80.4	73.7	109.0
Mar.	31.0	128.0	73.1	73.4	99.6
April	29.9	131.0	68.9	72.8	94.6
May	27.2	135.0	61.0	72.2	84.5
June	25.9	138.1	56.8	71.6	79.3
July	23.7	140.0	51.1	71.0	71.9
Aug.	23.8	142.0	50.8	70.4	72.1
Sept.	22.4	144.0	47.1	69.8	67.5
Oct.	22.9	146.0	47.4	69.5	68.3
Nov.	20.1	148.0	41.1	68.9	59.6
Dec.	18.8	149.7	38.1	68.6	55.5
1918					
Jan.	16.5	152.0	32.9	68.6	48.0
Febr.	16.4	154.0	32.0	68.6	46.7
Mar.	14.3	156.0	27.8	68.6	40.5
April	17.8	158.0	34.1	69.2	49.3
May	18.3	161.0	34.4	69.8	49.4
June	11.9	163.8	22.1	70.4	31.3
July	18.0	167.0	32.6	71.0	46.0
Aug.	17.8	170.0	31.7	71.6	44.3
Sept.	16.0	173.0	27.8	72.2	38.5
Oct.	9.6	175.0	16.6	72.8	22.8
Nov.	8.4	177.0	14.2	73.4	19.3
Dec.	8.9	179.3	15.1	74.3	20.3
1919					
Jan.	14.0	182.0	23.3	74.9	31.0
Febr.	18.6	185.0	30.5	75.8	40.2
Mar.	24.1	188.0	38.7	76.1	50.8
April	30.9	192.0	48.6	76.7	63.4
May	39.8	196.0	61.3	77.3	79.3
June	48.7	201.9	72.8	77.9	93.4
July	57.6	206.0	84.6	78.9	107.3
Aug.	62.1	210.0	89.4	80.1	111.7
Sept.	65.8	214.0	92.7	81.3	114.1
Oct.	67.4	217.0	94.0	82.5	113.9
Nov.	71.9	220.0	98.8	83.4	118.5
Dec.	73.6	223.0	99.7	83.7	119.1

TABLE IX—*Continued*

(1) Date	(2) Permits Index (Seasonally Adjusted 1920–30 = 100)*	(3) Building-Costs Index (1913 = 100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913 = 100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1920					
Jan.	69.8	237.0	89.1	84.0	106.1
Febr.	63.4	251.0	76.4	84.3	90.7
Mar.	61.7	264.4	70.4	84.9	82.9
April	57.1	270.0	63.7	85.8	74.3
May	54.0	275.0	59.2	86.4	68.5
June	48.4	279.3	52.3	87.6	59.7
July	48.6	277.0	52.9	88.8	59.5
Aug.	46.9	274.0	51.7	90.3	57.2
Sept.	44.6	271.4	49.5	91.8	53.9
Oct.	41.5	267.0	46.8	93.4	50.2
Nov.	38.7	263.0	44.4	94.9	46.8
Dec.	36.6	258.2	42.9	96.1	44.7
1921					
Jan.	42.4	250.0	51.4	97.0	53.0
Febr.	46.1	242.0	57.4	98.2	58.5
Mar.	51.4	232.8	66.8	99.4	67.2
April	50.8	225.0	68.3	100.9	67.7
May	53.9	218.0	74.6	102.4	72.9
June	58.0	210.7	83.1	103.9	79.9
July	61.9	204.0	91.5	105.7	86.6
Aug.	67.4	198.0	102.7	107.9	95.2
Sept.	71.6	191.6	113.0	110.0	102.7
Oct.	74.7	189.0	119.3	112.1	106.5
Nov.	75.9	187.0	122.7	113.9	107.7
Dec.	79.0	185.0	129.0	116.0	111.2
1922					
Jan.	81.0	183.5	133.2	117.8	113.1
Febr.	87.0	182.0	144.4	119.9	120.4
Mar.	85.8	180.4	143.8	122.1	117.8
April	90.7	180.5	151.7	124.5	121.8
May	91.9	180.6	153.8	126.9	121.2
June	93.2	180.7	155.9	129.3	120.6
July	92.1	186.0	149.5	131.7	113.5
Aug.	91.3	191.0	144.4	133.8	107.9
Sept.	93.8	196.3	144.4	135.6	106.5
Oct.	98.9	198.0	150.8	137.5	109.7
Nov.	108.3	199.3	164.0	139.0	118.0
Dec.	117.5	200.5	177.0	140.2	126.3
1923					
Jan.	125.4	202.5	187.0	141.4	132.3
Febr.	137.6	204.6	203.3	142.6	142.6
Mar.	130.6	206.7	190.9	143.8	132.8
April	119.6	209.0	173.1	145.0	119.4
May	100.3	212.0	142.9	146.2	97.7
June	96.1	214.7	135.3	147.4	91.8
July	96.9	214.4	136.6	148.9	91.7
Aug.	100.7	214.2	142.0	150.5	94.4
Sept.	109.2	214.0	154.1	152.0	101.4
Oct.	118.4	214.0	167.1	153.5	108.9
Nov.	129.1	214.1	182.2	155.0	117.8
Dec.	132.4	214.2	186.7	156.2	119.5

TABLE IX—*Continued*

(1) Date	(2) Permits Index (Seasonally Adjusted 1920–'30 = 100)*	(3) Building-Costs Index (1913 = 100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913 = 100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1924					
Jan.	142.7	213.6	201.8	157.4	128.2
Febr.	150.5	213.4	213.0	158.9	134.0
Mar.	140.7	212.2	200.3	160.1	125.1
April	124.3	212.3	176.7	161.6	109.3
May	104.8	212.8	148.6	163.1	91.1
June	101.9	210.5	146.2	164.7	88.8
July	98.1	208.0	142.6	166.2	85.8
Aug.	102.2	207.2	148.9	168.0	88.7
Sept.	110.2	206.9	161.0	169.5	95.0
Oct.	116.0	207.0	169.2	171.0	98.9
Nov.	122.4	206.0	179.5	172.2	104.2
Dec.	125.1	205.7	183.7	173.1	106.1
1925					
Jan.	133.6	204.0	197.9	174.0	113.7
Febr.	133.3	205.1	196.4	174.9	112.3
Mar.	137.9	205.1	203.0	175.2	115.9
April	131.1	203.7	194.6	175.8	110.7
May	129.7	203.7	192.4	176.1	109.3
June	130.2	203.0	193.7	176.4	109.8
July	134.7	201.6	201.8	176.7	114.2
Aug.	139.4	201.9	208.5	177.3	117.5
Sept.	142.7	202.3	213.0	177.9	119.7
Oct.	147.7	202.9	219.9	178.5	123.2
Nov.	148.7	204.1	220.2	179.2	122.9
Dec.	143.6	204.3	212.4	179.2	118.5
1926					
Jan.	136.8	204.2	202.4	178.9	113.2
Febr.	135.4	204.4	200.0	178.9	111.8
Mar.	132.0	204.8	194.9	178.5	109.1
April	127.1	205.2	187.0	178.2	104.9
May	122.7	204.3	181.6	177.6	102.2
June	121.8	204.3	180.1	176.7	101.9
July	125.7	203.4	186.7	175.8	106.2
Aug.	125.1	203.4	185.8	174.6	106.4
Sept.	134.8	203.2	200.3	173.1	115.7
Oct.	136.1	203.8	201.8	172.2	117.2
Nov.	141.1	203.8	209.1	171.3	122.0
Dec.	131.7	203.7	195.5	170.7	114.5
1927					
Jan.	139.3	203.7	206.6	170.1	121.5
Febr.	131.5	203.2	195.5	169.5	115.3
Mar.	126.9	203.2	188.8	168.6	112.0
April	118.0	203.2	175.5	167.7	104.7
May	110.0	203.1	163.7	166.5	98.4
June	106.1	203.4	157.7	165.6	95.3
July	109.3	204.1	161.9	164.0	98.7
Aug.	109.0	203.9	161.6	162.5	99.4
Sept.	110.9	204.1	164.0	161.3	101.7
Oct.	115.5	204.2	171.0	160.1	106.8
Nov.	119.9	204.1	177.3	159.5	111.2
Dec.	125.9	203.9	186.1	158.6	117.5

TABLE IX—*Continued*

(1) Date	(2) Permits Index (Seasonally Adjusted 1920–30 = 100)*	(3) Building-Costs Index (1913 = 100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913 = 100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1928					
Jan.	133.6	203.7	198.2	157.7	125.7
Febr.	133.9	202.9	199.4	156.8	127.2
Mar.	125.1	202.9	186.4	155.6	119.8
April	111.9	202.9	166.8	154.4	108.0
May	109.4	203.1	162.8	152.9	106.5
June	114.2	203.2	169.8	151.4	112.2
July	111.0	203.8	164.7	149.5	110.1
Aug.	106.4	203.8	157.7	147.7	106.7
Sept.	104.0	203.8	154.1	145.6	105.8
Oct.	104.4	203.7	155.0	143.8	107.8
Nov.	105.4	203.7	156.2	141.7	110.2
Dec.	112.5	203.4	167.1	139.6	119.7
1929					
Jan.	120.1	203.5	178.2	137.5	129.7
Febr.	129.8	203.6	192.7	135.3	142.4
Mar.	144.3	203.7	213.9	132.9	160.9
April	130.1	204.0	192.7	130.5	147.7
May	111.0	203.9	164.4	128.1	128.3
June	87.4	203.9	129.6	126.0	102.9
July	85.3	203.8	126.6	123.9	102.2
Aug.	86.1	203.9	127.5	121.8	104.7
Sept.	82.9	204.3	122.7	119.6	102.5
Oct.	82.9	204.9	122.4	117.5	104.1
Nov.	75.3	205.0	110.9	115.4	96.1
Dec.	68.0	204.1	100.6	113.6	88.6
1930					
Jan.	60.5	204.4	89.4	111.5	80.2
Febr.	59.8	204.6	88.2	109.7	80.4
Mar.	55.3	202.9	82.5	107.6	76.7
April	56.2	202.7	83.7	105.4	79.4
May	54.9	202.6	81.9	103.3	79.2
June	58.4	200.4	87.9	101.2	86.9
July	55.3	199.6	83.7	99.1	84.5
Aug.	58.0	196.7	89.1	97.0	91.9
Sept.	54.8	194.3	85.2	94.9	89.8
Oct.	56.1	191.3	88.5	93.1	95.1
Nov.	54.4	186.0	88.2	91.5	96.4
Dec.	54.8	185.3	89.4	89.7	99.7
1931					
Jan.	54.0	183.5	88.8	88.2	100.7
Febr.	53.5	183.5	88.2	86.7	101.7
Mar.	53.2	182.4	88.2	84.9	103.9
April	50.1	176.5	85.8	83.4	102.9
May	42.9	170.1	76.1	81.9	93.0
June	38.2	169.4	68.3	80.1	85.3
July	36.5	167.3	65.9	78.2	84.2
Aug.	37.4	165.9	68.0	76.4	88.9
Sept.	35.2	164.5	64.7	74.6	86.6
Oct.	31.4	163.1	58.3	73.4	79.4
Nov.	28.2	161.8	52.6	72.2	72.8
Dec.	25.6	160.4	48.3	70.7	68.4

TABLE IX—*Continued*

(1) Date	(2) Permits Index (Seasonally Adjusted 1930–30=100)*	(3) Building-Costs Index (1913=100)†	(4) B.B.N. Index (Column 2 Divided by Column 3 1913=100)	(5) Seven-Year Moving Average of B.B.N. Index	(6) Percentage B.B.N. Index Is of Moving Average
1932					
Jan.	23.8	159.0	45.3	69.5	65.2
Febr.	19.8	157.0	38.1	68.6	55.5
Mar.	16.4	156.0	31.7	67.4	47.1
April	13.1	154.0	25.7	66.5	38.6
May	12.6	153.0	24.8	65.6	37.8
June	11.3	151.0	22.7	64.4	35.2
July	10.6	150.0	21.5	63.1	34.0
Aug.	11.5	149.0	23.3	61.9	37.6
Sept.	11.5	149.0	23.3	60.4	38.5
Oct.	13.1	147.0	26.9	59.2	45.4
Nov.	12.4	146.0	25.7	58.3	44.0
Dec.	11.8	145.0	24.5	57.7	42.4
1933					
Jan.	9.9	142.0	21.1	57.4	36.8
Febr.	8.0	141.0	17.2	56.8	30.3
Mar.	7.3	140.0	15.7	56.5	27.8
April	7.8	140.0	16.9	56.2	30.1
May	9.8	140.0	21.1	55.9	37.8
June	11.4	141.0	24.5	55.9	43.8
July	12.1	148.0	24.8	55.9	44.3
Aug.	12.9	150.0	26.0	55.9	46.5
Sept.	12.8	151.0	25.7	55.9	45.9
Oct.	13.0	151.0	26.0	55.9	46.5
Nov.	12.4	152.0	24.8	56.2	44.1
Dec.	12.4	153.0	24.5	56.2	43.5

TABLE X

Estimated Population Growth and Building Activity in Seventeen Cities, 1875–1933*

(1) Year	(2) Population Growth	(3) Five-Year Moving Average Population Growth	(4) Building Permits Divided by Building Costs	(5) Seven-Year Moving Average Building Permits Deflated
	(1,000 Persons)		(In 1,000,000 1913 Dollars)	
1875	32	.....	67	.....
1876	41	.....	57	.....
1877	53	67	64	.....
1878	94	78	53	58
1879	116	94	47	63
1880	84	100	60	72
1881	125	108	61	84
1882	81	125	97	96
1883	131	177	125	111
1884	205	174	143	120
1885	341	182	141	130
1886	112	181	152	142
1887	121	228	118	158
1888	125	204	131	176
1889	444	226	185	199
1890	221	229	234	202
1891	219	261	269	211
1892	139	192	304	223
1893	282	194	172	221
1894	99	211	179	213
1895	227	249	220	196
1896	312	200	169	174
1897	327	188	175	169
1898	34	166	155	171
1899	42	140	149	166
1900	113	94	138	170
1901	182	126	190	178
1902	99	167	186	192
1903	195	189	196	207
1904	244	203	231	222
1905	225	231	252	228
1906	250	264	260	246
1907	243	252	237	265
1908	357	236	234	279
1909	184	233	314	289
1910	144	225	330	299

* See chapter v for method and basis of estimates.

TABLE X—*Continued*

(1) Year	(2) Population Growth	(3) Five-Year Moving Average Population Growth	(4) Building Permits Divided by Building Costs	(5) Seven-Year Moving Average Building Permits Deflated
	(1,000 Persons)		(In 1,000,000 1913 Dollars)	
1911	238	221	331	307
1912	202	247	320	318
1913	336	266	325	322
1914	317	241	299	301
1915	237	237	309	265
1916	116	221	342	249
1917	179	197	179	227
1918	258	234	78	221
1919	196	260	213	243
1920	419	304	169	269
1921	250	331	256	318
1922	398	358	460	395
1923	393	308	528	444
1924	330	320	519	495
1925	171	272	616	526
1926	306	214	561	514
1927	157	144	521	471
1928	105	72	474	421
1929	— 21	— 17	380	344
1930	—186	— 88	225	270
1931	—140	.....	173	.....
1932	—196	.....	71	.....
1933	.....	.....	45	.....

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